



ACROSS UNKNOWN SOUTH AMERICA

A. HENRY SAVAGE-LANDOR

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Landor, Arnold

Across unknown South America

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ACROSS UNKNOWN SOUTH AMERICA



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Arnold

BY

~~A. HENRY SAVAGE-LANDOR~~

AUTHOR OF

"IN THE FORBIDDEN LAND," "AN EXPLORER'S ADVENTURES IN
TIBET," "ACROSS WILDEST AFRICA," "ACROSS COVETED
LANDS," "THE GEMS OF THE EAST," ETC.

WITH EIGHT FULL-PAGE PLATES IN COLOR
NUMEROUS ILLUSTRATIONS FROM
PHOTOGRAPHS, AND MAPS

IN TWO VOLUMES

VOL. I

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This Work
IS
DEDICATED TO THE PEOPLE OF THE
GREAT BRAZILIAN REPUBLIC



PREFACE

SOUTH AMERICA is, to my mind, the "Coming Continent" — the continent of the future. Everybody knows the wealth of the Argentine, Peru, Chile, and Bolivia; but the interior of Brazil, the largest and richest country of all, not unlike forbidden Tibet, was perhaps better known a century or two ago than now. Few people realize that Brazil is larger than the United States of North America, Germany, Portugal, and a few other countries taken together. The interior is practically a *terra incognita*, although the ancient Jesuits and, at a later date, escaped slaves and native rubber collectors have perhaps found their way inland to a considerable distance.

When I started on the trans-continental journey I did not take Europeans with me. It is not easy to find men who can stand the strain of so long a journey. I was also not surprised, although I was disappointed, not to be able to obtain suitable officers in Brazil to go part of the journey with me, so that I might be relieved of a portion of the tedious scientific work of the expedition, especially taking and computing daily astronomical observations, to which much time has to be devoted. All the work of all kinds eventually fell upon my shoulders, and after departing I found myself filling the posts of surveyor, hydrographer, cartographer, geologist, meteorologist, anthropologist, botanist, doctor, veterinary surgeon, painter, photographer, boat-builder, guide, navigator, etc. The muleteers who accompanied me — only six, all counted — were of little help to me, perhaps the re-

verse. Considering all the adventures and misfortunes we had, I am sure the reader, after perusing this book, will wonder that we got back at all, and will be indulgent enough to give me a little credit for saving, through innumerable disasters — and perhaps not altogether by mere luck — all my photographs (eight hundred of them), all my note-books, all my scientific observations, as well as all the vocabularies I made of the various Indian languages of tribes found on my way. Also for bringing all my men out alive.

Here are, briefly, a few results of the expedition:

(a) First of all it has proved that, far from being an impenetrable country, as was believed, it is possible for any experienced traveller to cross Brazil in any direction if he can obtain suitable followers.

(b) It has proved that the “millions of savage Indians” supposed to be swarming all over the interior of Brazil do not exist at all. All the pure Indians of Central Brazil taken together may number a few hundreds, or, including half-castes (negroes and Portuguese), a few thousands. As for the wild beasts and snakes, no one ever need fear being troubled by them; they are more afraid of you than you of them, you can take my word for it. So that the terror which has so far prevented people from penetrating the interior has no reasonable ground, and this book ought to be the means of making European people some day swarm to develop that marvellous land, now absolutely uninhabited.

(c) Meteorological observations were recorded daily right across Brazil.

(d) Altitude observations, forming a complete chain and including all minor undulations, were registered across the entire South American continent, from the Atlantic coast at Rio de Janeiro as far as Callao on the Pacific coast. The observations were taken with a hypsometer and several excellent aneroids. These show that

many of the elevations marked on the existing maps of Brazil are inaccurate, the error amounting sometimes to several hundred feet.

(*e*) A complete survey was made of new country between the Araguaya River and the Madeira, including a careful survey of the Arinos River and the river Arinos-Juruena, one of the most powerful tributaries of the Amazon. In the small map, reproduced from the best existing maps, at the end of the first volume, several high mountain ranges, quite as high as the Andes, may be noticed extending from north to south between the rivers Madeira, Tapajoz, Xingu, Araguaya, and Tocantins. Those high ranges are merely the work of imaginative cartographers, who have drawn them to make the map look pretty. They do not exist. I have left them in order to draw the attention of the reader to them. The position of the Arinos-Juruena is from one to one and a half degrees farther west than it is there drawn, and should be where I have marked the red line of my route.

(*f*) Everything that was of interest pictorially, geologically, botanically, or anthropologically was photographed or sketched. Astronomical observations were constantly taken to determine the positions of our camps and places of importance.

Botanical and geological collections were made, but unfortunately had to be abandoned.

(*g*) During the journey the head waters of the following important rivers were visited: The Rio Vermelho, Rio Claro, Rio Araguaya, Rio Barreiros, Rio das Mortes, Rio S. Lourenço, the Cuyaba, the Xingu, the Parana-tinga, the Paraguay (Paraná), the Rio Arinos, the Secundury.

(*h*) The entire course of the river Tapajoz was studied, and also the entire course of the Amazon from its mouth almost to its birthplace in the Andes.

(*i*) Useful vocabularies were drawn up of the follow-

ing Indian languages: Bororo, Apiacar, Mundurucu, Campas or Antis.

(*j*) The expedition has furthermore shown that it is possible with poor material in the way of followers to accomplish work of unusual difficulty.

(*k*) That it is possible for people in a normal condition of health to go at least sixteen days without food while doing hard work.

(*l*) That it is possible to cross an entire continent — for one entire year — in the company of dangerous and lazy criminals without any weapon for protection — not even a penknife — and to bring forth from such poor material remarkable qualities of endurance, courage, and almost superhuman energy.

(*m*) Last, but not least, on that expedition I was able to collect further evidence that a theory I had long held as to the present shape of the earth was correct. I had never believed in the well-known theory that a continent, now submerged, once existed between America, Europe, and Africa — in other words, where the Atlantic Ocean is now. That theory has found many followers. In support of it one is told that such islands as Madeira, the Canaries, the Azores, are the topmost peaks of a now partly submerged range of mountains which once stood upon that vanished continent. It is also a common belief that Northern Africa underwent the contrary process, and was pushed up from under the sea. That is why, it is said, the Sahara Desert, which was formerly, without doubt, an ocean bed, is now dry and above water.

One has only to look at any map of the entire world to see what really happened to the earth in days long gone by. Let me first of all tell you that there never existed a continent between Africa and South America. In fact, I doubt whether there is as much as a square mile between those two continents more submerged to-day than it was thousands upon thousands of years ago.

Here is what really happened. The earth at one period changed its shape — when, is merely guesswork and is of no consequence here — and the crust of the earth — not the core, mind you — split into two great gaps from pole to pole, with a number of other minor fissures. In other words, the earth opened just like the skin of an over-heated baked apple. The African and American continents, as well as Australasia, with New Guinea, the Celebes Islands, the Philippine Archipelago, and China, which before that event formed part of one immense continent, thus became divided, leaving North and South America isolated, between the Atlantic and the Pacific — which were then, and only then, formed.

It is easy, by looking intelligently at a map, to reconstruct the former shape of the world. You will notice that the most western portion of Africa fits exactly into the gap between North and South America, while the entire African coast between Dahomey and the Cape Colony fits perfectly, in all its indentations and projections, into the coast line of South America. The shores of Western Europe in those days were joined to North America, and find to-day their almost parallel and well-fitting coast line on the east coast of the United States and Canada. On the opposite side of the world, the western side of South America, the same conditions can be noticed, although the division of the two continents (America and Asia) is there much wider. Fragments were formed, leaving innumerable islands scattered in the Pacific Ocean, half way between the actual continents of Asia, Australia, and America. A mere glance is sufficient to show how well Australia fits in along the Chilian and Peruvian coast, the great island of New Guinea along part of Peru and Ecuador and the west coast of the Central American Isthmus. The Philippine Islands probably in those days lay alongside of Guatemala, while California bordered on Japan.

Such immense rivers as the Amazon, and its portentous tributaries flowing from south to north, were also formed, perhaps at that time, great fissures caused by the sudden splitting and cooling of the earth's crust becoming the river beds. So, perhaps, was formed the giant cañon of Colorado and the immense fissures in the earth's crust that occur in Central Asia, in Central Africa, and, as we shall see, on the central plateau of Brazil.

Undoubtedly the Antarctic continent was once joined to South America, Australia, and Africa. During the last Antarctic expeditions it has been shown that the same geological formation exists in South America as in the Antarctic plateau.

On perusing this book, the reader will be struck by the wonderful resemblance between the Indians of South America, the Malay races of Asia, and the tribes of Polynesia. I maintain that they not only resemble each other, but are actually the same people in different stages of development, and naturally influenced to a certain extent by climatic and other local conditions. Those people did not come there, as has been supposed, by marching up the entire Asiatic coast, crossing over the Behring Straits and then down the American coast, nor by means of any other migration. No, indeed: it is not they who have moved, but it is the country under them which has shifted and separated them, leaving members of the same race thousands of miles apart.

I was able to notice among the Indians of Central Brazil many words of Malay origin, others closely resembling words of languages current among tribes of the Philippine Islands. The anthropometric measurements which I took of South American Indians corresponded almost exactly with those of natives of the Sulu Archipelago and the island of Mindanao.

I hope some day to use the wealth of material I have collected among innumerable tribes on the Asiatic coast,

on the islands of the Pacific Ocean, in South America and in Africa, in making a comparative study of those peoples. It should prove interesting enough. I have no space here to go deeply into the subject, as this is a book descriptive of South America merely. I may add that the most ardent supporter of the above theory is the celebrated explorer and scientist, Colonel Marchand, of Fashoda fame — a man who has studied and understands the mysteries of this world better than any man living.

My sincere thanks are due to the following gentlemen for much politeness shown me in connection with the expedition: To Mr. Georges Babin, the famous writer of Paris; to Mr. Manoel Bomfin (ex-deputy of Brazil), to Senador Alcindo Guanabara, for the keen interest taken in the expedition and for proposing to Congress after my return that a grant of £4,000 should be given to me as a reward for the work done. I herewith also express my gratitude to the Brazilian Government for paying me that sum, which came in usefully to defray part of the expenses of the expedition. To H. E. Dr. Pedro de Toledo, Minister of Agriculture, for the intelligent desire shown to help as much as he could in the venture, and for kindly giving me the free use of all the telegraphs in Brazil, including the Amazon Cable, and other important privileges; to Dr. José Carlos Rodriguez for hospitality and much valuable advice; to Dr. Paolo de Frontin, *Conselheiro Antonio Prado*, Dr. José Pereira Rebouças, and Mr. Mockill and their respective Companies for the many privileges granted me upon the various railways of which they were the Presidents. To Colonel R. E. Brazil and Commandante Macedo for their kind hospitality to me while navigating the lower Tapajoz River; to Dr. A. B. Leguia, President of the Peruvian Republic; to the British Ministers at Petropolis, Lima, La Paz, and Buenos Aires, and the British Consuls of Rio de Janeiro, Pará, Manaos, Iquitos, Antof-

gasta, Valparaiso; finally, to the British and American residents at all those places for much exquisite hospitality offered me.

Special thanks are due to Mr. Regis de Oliveira, Brazilian ex-Minister in London, for valuable credentials given me before my departure which paved the way to the hearty reception I received everywhere in Brazil.

A. HENRY SAVAGE-LANDOR.

SAVOY HOTEL, LONDON,
September, 1913.

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Across Unknown South America

CHAPTER I

THE HEART OF BRAZIL—BRAZIL, ITS SIZE AND ITS IMMENSE WEALTH—
RIO DE JANEIRO—BRAZILIAN MEN OF GENIUS—SÃO PAULO—THE
BANDEIRANTES—THE PAULISTA RAILWAY

“**M**ORE than three months to reach the spot?” asked the cinematograph man in amazement. “Then perhaps Monsieur is on a journey to Mars or the moon! There is no spot on earth that takes so long to reach.” (Hearty laughter at his own wit.)

That exclamation, and wise words that follow, came from the assistant of one of the largest firms of cinematograph appliances in Paris, where I had called in order to purchase a moving picture apparatus and 10,000 meters of film to be used on my forthcoming journey across the South American continent.

The shop assistant had very honestly warned me that if the films were to be used in a damp, tropical climate, they must be exposed and developed within three months of their manufacture. After that time they would become so perforated and fogged as to be quite useless. I had remarked that it would take me more than three months to reach the spot where I should begin to take cinematograph pictures.

“Will Monsieur please tell where is the spot where he would be likely to use the films?” continued the assistant, still overcome with surprise.

“In the heart of Brazil.”

ACROSS UNKNOWN SOUTH AMERICA

“In the heart of Brazil . . . in the very heart of Brazil? . . . *Oh, mon Dieu! mon Dieu!*” (More laughter and a look of compassion at me.) “*Mais nous avons une de nos maisons tout à fait près de là!*” (“Why, indeed, we have one of our factories quite close to there.”)

It was then my turn for hearty laughter and the look of compassion.

“Pray,” I inquired, “tell me more exactly. Where is your factory close to the heart of Brazil?”

“It is quite, quite close. It is in Montreal, Canada. . . . You will send your films there . . . two or three days’ journey. . . . It will take us a week to develop them . . . two or three days for their return journey. In a fortnight you will have them back again.”

Quite close, indeed: only a distance of some 65° of latitude — or some 7,170 kilometres as the crow flies — with no direct communication by land or water!

That was the Frenchman’s knowledge of geography; but I find that the average Englishman, unless he is directly interested in those countries, knows little better, and perhaps even less. Time after time I have been asked in London if Brazil were not a province of Mexico, and whether it is not through Brazil that the Americans are cutting the Panama Canal! There are many who have a vague idea that Brazil is a German colony; others, more patriotic, who claim it as an English possession. Many of those who have looked at the map of the world are under the impression that Spanish is spoken in Brazil, and are surprised when you tell them that Portuguese happens to be the local language. Others, more enlightened in their geography by that great play *Charley’s Aunt*, imagine it a great forest of nut trees. Others, more enlightened still, believe it to be a land where you are constantly walking in avenues adorned with wonderful orchids, with a sky overhead swarming

THE SIZE OF BRAZIL

with birds of beautiful plumage. I have been asked in all seriousness whether I found the Andes quite flat — great prairies (the person had heard of the Argentine *pampas* and got mixed up) — or whether “it” was merely a large lagoon!

I could quote dozens more of these extreme cases of ignorance, but of one thing I am certain, and that is, that there are few people in the British Isles who realize the actual size of the great Brazilian Republic.

Brazil is 8,524,778 square kilometres — with the territory of the Acre newly acquired from Bolivia, 8,715,778 square kilometres — in extent; that is to say, it covers an area larger than the United States of North America, Germany, Portugal, Greece, and Montenegro taken together.

Some of the States of the Republic are larger than some of the largest countries in Europe: such as the State of the Amazonas with 1,894,724 square kilometres; the State of Matto Grosso with 1,378,784; the State of Para with an area of 1,149,712 square kilometres; the State of Goyaz with 747,311; the State of Minas Geraes with 574,855; the Acre territory, 191,000 square kilometres.

There are fewer people still who seriously appreciate the great importance of that beautiful country — with no exception the richest, the most wonderful in the world; to my mind undoubtedly the continent of the future.

Incalculable is the richness of Brazil in mineral wealth. Magnificent yellow diamonds are to be found in various regions, those of Minas Geraes and Matto Grosso being famous for their purity and extraordinary brilliancy; agates, moonstones, amethysts, emeralds, sapphires, rubies, topazes, and all kinds of beautiful rock crystals are plentiful. Gold exists in many regions on the central plateau — but particularly in Minas Geraes and Matto Grosso; and platinum in the States of São Paulo,

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Minas Geraes, Sta. Catharina, and Espirito Santo; silver, mercury, lead, tin, salicylated and natural copper are found in many places, as well as graphite, iron, magnetic iron, oxide of copper, antimony, argentiferous galena, malachite, manganese oxide, alum, bituminous schist, anthracite, phosphate of lime, sulphate of sodium, hæmatite, monazitic sands (the latter in large quantities), nitrate of potassium, yellow, rose-coloured, and opalescent quartz, sulphate of iron, sulphate of magnesia, potash, kaolin. Coal and lignite of poor quality have been discovered in some regions, and also petroleum, but not in large quantities.

Springs of thermal and mineral waters are numerous — particularly those of which the waters are sulphurous or ferruginous; others contain arsenic and magnesia.

Most beautiful marble of various colours is to be found, and also enormous quantities of mica and amianth; porphyry and porphyroid granite, carbonated and hydroxided iron, argillaceous schist, mica schist.

Even richer than the mineral wealth is the botanical wealth, hitherto dormant, of Brazil. Valuable woods occur in many Brazilian forests — although it must not for one moment be imagined that entire forests are to be found composed of useful woods. Indeed this is not the case. Most of the woods are absolutely valueless. Still, when it is realized that the forests of Brazil extend for several millions of square kilometres, it is easy to conceive that there is plenty of room among a majority of poor trees for some good ones. Most Brazilian woods are interesting on account of their high specific gravity. Few, very few, will float on water. On the central plateau, for instance, I could not find a single wood which floated — barring, under special conditions, the burity palm (*Mauritia vinifera* M.). Along the banks of the Amazon and in the northern part of Brazil this is not quite the case. Some Brazilian woods, such as the



RIO DE JANEIRO.
Showing the beautiful Avenida Central.



RIO DE JANEIRO AS IT WAS IN 1903.

THE BRAZILIAN FOREST

iron-tree (pao-ferro), whose name fitly indicates its character, are of extraordinary hardness. The Brazilian forest, although not specially rich in woods for building and naval purposes, is nevertheless most abundant in lactiferous, oleiferous, fibrous, medicinal, resinous, and industrial plants — such for instance as can be used for tanning purposes, etc. No country in the world is as rich as Brazil in its natural growth of rubber trees; nor have I ever seen anywhere else such beautiful and plentiful palms; the piassava (*Attalia fumifera* M.), the assahy (*Euterpe oleracea* L.), the burity (*Mauritia vinifera* M.), the carnauberia (*Copernicia cerifera* M.), the palmito (*Euterpe edulis* M.), and many others. I shall give a more detailed description of the most important of these plants as we proceed on our journey and find them in their habitat.

Where, perhaps, Brazil's greatest richness lies, is in its hundreds of thousands of square miles of wonderful pasture lands — perfectly ideal, with plenty of excellent water and a delicious climate — capable of some day fattening enough cattle to supply half the world with meat.

All these wonderful riches are absolutely dormant; more than that, absolutely wasted for lack of population, for lack of roads, trails, railways, or navigation of the rivers. The coast of Brazil is highly civilized, and so, more or less, is the immediate neighbourhood of large cities; but the moment you leave those cities, or the narrow zone along the few hundred kilometres of railways which now exist, you immediately relapse into the Middle Ages. When you get beyond the comparatively narrow belt of semi-civilization, along the coast, Brazil is almost as unknown as Mars or the moon. The people who know least the country are, curiously enough, the Brazilians themselves. Owing greatly to racial apathy, they care little for the trouble of developing their beautiful land.

ACROSS UNKNOWN SOUTH AMERICA

They watch with envy strangers taking gold, diamonds, platinum, and precious stones out of their country. They accuse foreigners of going there to rob them of their wealth; yet you seldom meet a Brazilian who will venture out of a city to go and help himself. The Brazilian Government is now beginning to wake up to the fact that it is the possessor of the most magnificent country on earth, and it is its wish to develop it; but the existing laws, made by short-sighted politicians, are considered likely to hamper development for many years to come.

Brazil is not lacking in intelligent men. Indeed, I met in Rio de Janeiro and São Paulo men who would be remarkable anywhere. Councillor Antonio Prado of São Paulo, for instance, was a genius who had done wonders for his country. The great development of the State of São Paulo compared with other States is chiefly due to that great patriot. Then the Baron de Rio Branco — the shrewd diplomatist, who has lately died — has left a monument of good work for his country. The cession of the immensely rich tract of the Acre Territory by Bolivia to Brazil is in itself a wonderful achievement. Dr. Pedro de Toledo, the present Minister of Agriculture, is a practical, well-enlightened, go-ahead gentleman, who makes superhuman efforts, and in the right direction, to place his country among the leading States of the two Americas. Dr. Lauro Severiano Müller, the new Minister of Foreign Affairs, is a worthy successor of Baron de Rio Branco. There are many other persons of positive genius, such as Senator Alcindo Guanabara, a man of remarkable literary ability, and one of the few men in Brazil who realize thoroughly the true wants of the Republic, a man of large views, who is anxious to see his country opened up and properly developed. Another remarkable man is Dr. José Carlos Rodriguez, the proprietor of the leading newspaper in Rio — the *Jornal do Commercio* — and the organizing genius of some of the

MEN OF GENIUS

most important Brazilian commercial ventures. Having had an American and English education, Dr. Rodriguez has been able to establish in Rio the best edited and produced daily newspaper in the world. Its complete service of telegraphic news from all over the globe — on a scale which no paper, even in England, can equal or even approach — the moderate tone and seriousness of its leading articles, its highly reliable and instructive columns on all possible kinds of subjects by a specially able staff of the cleverest writers in Brazil, and the refined style in which it is printed, do great honour to Dr. Rodriguez. Then comes another man of genius — Dr. Francisco Pereira Passos, who, with Dr. Paulo de Frontin, has been able in a few years to transform Rio de Janeiro from one of the dirtiest and ugliest cities in South America into the most beautiful. The great drive around the beautiful bay, the spacious new Avenida Central — with its parallel avenues of great width — the construction of a magnificently appointed municipal theatre, the heavenly road along the Tijuca mountains, encircling and overlooking the great harbour, and a thousand other improvements of the city are due to those two men. Dr. Paulo Frontin has also been active in developing the network of railways in Brazil. Whatever he has undertaken, he has accomplished with great judgment and skill.

It would be impossible to enumerate here all the clever men of Brazil. They are indeed too numerous. The older generation has worked at great disadvantage owing to the difficulty of obtaining proper education. Many are the illiterate or almost illiterate people one finds even among the better classes. Now, however, excellent and most up-to-date schools have been established in the principal cities, and with the great enthusiasm and natural facility in learning of the younger generations wonderful results have been obtained. On account partly of the exhausting climate and the indolent life that Brazilians

ACROSS UNKNOWN SOUTH AMERICA

are inclined to lead, a good deal of the enthusiasm of youth dies out in later years; still Brazil has in its younger generation a great many men who are ambitious and heartily wish to render their country service. It is to be hoped that their efforts may be crowned with success. It is not talent which is lacking in Brazil, it is not patriotism; but persistence is not perhaps the chief characteristic among races of Portuguese descent. In these days of competition it is difficult to accomplish anything great without labour and trouble.

I left London on December 23, 1910, by the Royal Mail steamship *Amazon*, one of the most comfortable steamers I have ever been on.

We touched at Madeira, Pernambuco, and then at Bahia. Bahia seen from the sea was quite picturesque, with its two horizontal lines of buildings, one on the summit of a low hill range, the other along the water line. A border of deep green vegetation separated the lower from the upper town. A massive red building stood prominent almost in the centre of the upper town, and also a number of church towers, the high dome of a church crowning the highest point.

I arrived in Rio de Janeiro on January 9, 1911.

It is no use for me to give a description of the city of Rio de Janeiro. Everybody knows that it is — from a pictorial point of view — quite a heavenly spot. Few seaside cities on earth can expect to have such a glorious background of fantastic mountains, and at the same time be situated on one of the most wonderful harbours known. I have personally seen a harbour which was quite as strangely interesting as the Rio harbour — but there was no city on it. It was the Malampaya Sound, on the Island of Palawan (Philippine Archipelago). But such an *ensemble* of Nature's wonderful work combined with man's cannot, to the best of my knowledge, be found anywhere else than in Rio.

RIO DE JANEIRO

It does not do to examine everything too closely in detail when you land—for while there are buildings of beautiful architectural lines, there are others which suggest the work of a pastrycook. To any one coming direct from Europe, some of the statuary by local talent which adorns the principal squares gives a severe shock. Ladies in evening dress and naked cupids in bronze flying through national flags flapping in the wind, half of their bodies on one side of the flags, the other half on the other side, look somewhat grotesque as you approach the statues from behind. But Rio is not the only place where you see grotesque statuary; you have not to go far from or even out of London to receive similar and worse shocks. If Rio has some bad statues, it also possesses some remarkably beautiful ones by the sculptor Bernardelli—a wonderful genius who is now at the head of the Academy of Fine Arts in Rio. This man has had a marvellous influence in the beautifying of the city, and to him are due the impressive lines of the finest buildings in Rio, such as the Academy of Fine Arts. Naturally, in a young country like Brazil—I am speaking of new Brazil, now wide awake, not of the Brazil which has been asleep for some decades—perfection cannot be reached in everything in one day. It is really marvellous how much the Brazilians have been able to accomplish during the last ten years or so in their cities, on or near the coast.

Brazilians have their own way of thinking, which is not ours, and which is to us almost incomprehensible. They are most indirect in their thoughts and deeds—a characteristic which is purely racial, and which they themselves cannot appreciate, but which often shocks Europeans. For instance, one of the most palatial buildings in the Avenida Central was built only a short time ago. In it, as became such an up-to-date building, was established a lift. But do you think that the architect, like all other architects anywhere else in the world,

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would make the lift start from the ground floor? No, indeed. The lift only starts from the second floor up — and, if I remember rightly, you have to walk some thirty-eight steps up a grand staircase before you reach it! Do you know why? Because the architect wished to compel all visitors to the building to admire a window of gaudy coloured glass half-way up the staircase. Thus Brazilians reason about nearly everything. They have not yet mastered the importance and due proportion of detail. Frequently what is to us a trifling detail is placed by them in the forefront as the most important point.

Thanks to the strong credentials I carried — among which were letters from H. E. Regis de Oliveira, Brazilian Minister in London — I was received in Rio de Janeiro with the utmost consideration and kindness. From the President of the Republic to the humblest citizens, all, with no exception, treated me with charming civility. My stay in Rio was a delightful one. The Brazilians of the principal cities were most courteous and accomplished, and it was a great pleasure to associate with them. Intense interest was shown by the Government of the country and by the people in my plan to cross the continent. Dr. Pedro de Toledo, the Minister of Agriculture, was specially interested in the scheme, and it was at first suggested that the expedition should be an Anglo-Brazilian one, and that I should be accompanied by Brazilian officers and soldiers. Colonel Rondon, a well-known and brave officer, was ordered by the Government to find suitable volunteers in the army to accompany my expedition. After a long delay, Colonel Rondon informed me that his search had been unsuccessful. Colonel Rondon said he would have gladly accompanied the expedition himself, had he not been detained in Rio by his duties as Chief of the Bureau for the Protection and Civilization of the Indians. Another officer offered his services in a private capacity, but as he became



Pedro de Toledo
Rio 19-2-911

MINISTER OF AGRICULTURE, BRAZIL.



SENATOR ALCINDO GUANABARA.
A great literary genius and patriot of Brazil.

EQUIPMENT OF THE EXPEDITION

involved in a lawsuit, the negotiations were suddenly interrupted.

I endeavoured to find suitable civilians. No one would go. The Brazilian forest was worse, more impenetrable than any other forest in the world. Brazilian rivers were broader, deeper, and more dangerous than any other river on earth. Wild beasts in Brazil were more numerous and wilder than the wildest animals of Africa or Asia. As for the Indians of Central Brazil, they were innumerable — millions of them — and ferocious beyond all conception. They were treacherous cannibals, and unfortunate was the person who ventured among them. They told stories galore of how the few who had gone had never come back. Then the insects, the climate, the terrible diseases of Central Brazil were worse than any insect, any climate, any terrible disease anywhere. That is more or less the talk one hears in every country when about to start on an expedition.

I had prepared my expedition carefully, at a cost of some £2,000 for outfit. Few private expeditions have ever started better equipped. I carried ample provisions for one year (tinned meats, vegetables, a thousand boxes of sardines, fruits, jams, biscuits, chocolate, cocoa, coffee, tea, etc.), two serviceable light tents, two complete sets of instruments for astronomical and meteorological observations, and all the instruments necessary for making an accurate survey of the country traversed. Four excellent aneroids — which had been specially constructed for me — and a well-made hypsometrical apparatus with six boiling-point thermometers, duly tested at the Kew Observatory, were carried in order to determine accurately the altitudes observed. Then I possessed two prismatic and six other excellent compasses, chronometers, six photographic cameras, specially made for me, with the very best Zeiss and Goertz lenses, and some fourteen hundred glass photographic plates — including some for

ACROSS UNKNOWN SOUTH AMERICA

colour photography. All articles liable to be injured by heat and damp were duly packed in air and water-tight metal cases, with outer covers of wood. Then I carried all the instruments necessary for anthropometric work, and painting materials for recording views and scenes in colours when the camera could not be used, as at night or when the daylight was insufficient. I had a complete supply of spades, picks, large saws, axes, and heavy-bladed knives (two feet long) for cutting our way through the forest, making roads, and constructing rafts, canoes, and temporary bridges.

I carried, as usual, very little medicine — merely three gallons of castor oil, a few bottles of iodine, some formiate of quinine, strong carbolic and arsenical soaps, permanganate and other powerful disinfectants, caustic; that was about all. These medicines were mostly to be used, if necessary, upon my men and not upon myself.

I had twelve of the best repeating rifles that are made, as well as excellent automatic pistols of the most modern type, and several thousand rounds of ammunition — chiefly soft-nosed bullets. These weapons were carried in order to arm my followers. Although I had several first-class rifles for my own use, following my usual custom, I never myself carried any weapons, not even a penknife, upon my person except when actually going after game. Again on this occasion as on previous journeys, I did not masquerade in fancy costumes, such as are imagined to be worn by explorers, with straps and buckles and patent arrangements all over. I merely wore a sack coat with ample pockets, over long trousers such as I use in town. Nor did I wear any special boots. I always wore comfortable clothes everywhere, and made no difference in my attire between the Brazilian forest and Piccadilly, London. When it got too hot, naturally I removed the coat and remained in shirt sleeves; but that was all the difference I ever made in my wearing

A DANGEROUS EXPEDITION

apparel between London and Central Brazil. I have never in my life adopted a sun helmet — the most absurd, uncomfortable and grotesque headgear that was ever invented. I find, personally, that a common straw hat provides as much protection as any healthy person requires from the equatorial sun.

If I give these details, it is merely because they may be of some use to others, not because I wish to advertise these facts; and also, if I do not give the names of the firms which supplied the various articles, it is because — unlike many other explorers — I have been in the custom of never letting my name be used in any way whatever for advertising purposes.

There are many people who are enthusiastic over a dangerous project when they first hear of it, but after thinking it over and talking with friends and relatives, their enthusiasm soon wears off. That is what happened in Rio. I wasted some time in Rio — socially most enjoyably employed — in order to get followers and come to some suitable arrangement with the Government. I was deeply indebted to the Minister of Agriculture, Dr. Pedro de Toledo, for allowing me the free use of all the telegraphs in Brazil, and also for a special permission (of which I never availed myself) to use, if necessary, the flotilla of Government boats on the Amazon. Credentials were also furnished me, but owing to the way in which they were worded, they were more of a danger to me than a protection. They actually proved to be so once or twice, when I was compelled to present them. The expedition was considered so dangerous, that the Government published broadcast statements in the official and other papers stating that “Mr. A. H. Savage-Landor’s expedition across Brazil was undertaken solely at his own initiative and absolutely at his own risk and responsibility.” They also circulated widely the statement that I had promised not in any way to injure or hurt

ACROSS UNKNOWN SOUTH AMERICA

the native Indians, that I would not supply them with firearms of any kind, and that I would in no way ill-treat them. I had gladly promised all that. I had not even dreamt of doing any of those things to the natives, and naturally I strictly kept my promise.

In a luxurious Administration car placed at my disposal by Dr. Paulo Frontin, I left Rio by the Central Railway, escorted as far as São Paulo by Dr. Carlo da Fonseca, a railway engineer, sent to look after my comfort by the Central Brazilian Railway Company.

On approaching São Paulo in the early morning, I was much struck by the activity of the waking city as compared with Rio. Carts were dashing to and fro in the streets, the people walked along fast as if they had something to do, and numerous factory chimneys ejected clouds of smoke, puffing away in great white balls. The people stopped to chat briskly, as if they had some life in them. It seemed almost as if we had suddenly dropped into an active, commercial, European city. The type of people, their ways and manners, were different from those of the people of Rio — but equally civil, equally charming to me from the moment I landed at the handsome railway station.

With a delicious climate — owing to its elevation — with a population of energetic people chiefly of Italian origin, instead of the apathetic mixture of Portuguese and negro, São Paulo is indeed the most flourishing city of the Brazilian Republic. Its yearly development is enormous. Architecturally it is gradually becoming modified and improved, so that in a few years it will be a very beautiful city indeed. Already the city possesses beautiful avenues and a wonderful theatre.

Everybody knows what an important part the enterprising people of São Paulo have played in the expansion and colonization of the central and southern regions of Brazil. The early activity of the Paulistas — it dates

THE PAULISTAS

back to 1531 — can be traced from the River Plate on the south, to the head waters of the Madeira in Matto Grosso on the east, and as far as Piantry on the north.

I cannot indulge here, as I should like to do, in giving a complete historical sketch of the amazing daring and enterprise of those early explorers and adventurers and of their really remarkable achievements. Their raids extended to territories of South America which are to-day almost impenetrable. It was really wonderful how they were able to locate and exploit many of the most important mines within an immense radius of their base.

The history of the famous Bandeiras, under the command of Raposo, and composed of Mamelucos (crosses of Portuguese and Indians) and Tupy Indians, the latter a hardy and bold race, which started out on slave-hunting expeditions, is thrilling beyond words and reads almost like fiction. The ways of the Bandeirantes were sinister. They managed to capture immense numbers of slaves, and must have killed as many as they were able to bring back, or more. They managed, therefore, to depopulate the country almost entirely, the few tribes that contrived to escape destruction seeking refuge farther west upon the slopes of the Andes.

Although the Brazilians, even in official statistics, estimate the number of pure, savage Indians in the interior at several millions, I think that the readers of this book will be convinced, as I was in my journey across the widest and wildest part of Brazil, that perhaps a few hundreds would be a more correct estimate. Counting half-castes, second, third, and fourth crosses, and Indians who have entirely adopted Portuguese ways, language, and clothes, they may perhaps amount to several thousand — but that is all.

The Jesuits endeavoured to save the Indians from the too-enterprising Bandeirantes, with the result that the

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missions were destroyed, and the missionaries driven away or killed.

Brazil occupies to-day in the world's knowledge practically the same position that forbidden Tibet occupied some fifteen or twenty years ago. It was easier to travel all over Brazil centuries ago than now.

The Bandeirantes became extraordinarily daring. In 1641 another slave-hunting Paulista expedition started out to sack the missions of Paraguay and make great hauls of converted Indians. The adventurers invaded even the impenetrable territory of the Chaco. But history tells us that the Jesuits, who were well prepared for war, were not only able to trap the four hundred Paulista Bandeirantes in an ambushade and to set free their prisoners, but killed a great number of them, one hundred and twenty of the adventurous Bandeirantes thus supplying a handsome dinner for the cannibal Chaco Indians. Infuriated at the reverse, the survivors of the expedition destroyed all the missions and Indian villages upon their passage, not one escaping. They came to grief, however, in the end. Only a few returned home to tell the tale. That lesson practically ended the slave-hunting expeditions on a large scale of the Bandeirantes, but not the expeditions of parties in search of gold and diamonds, many of which were extraordinarily successful. Minor expeditions were undertaken, in which Paulista adventurers were employed under contract in various parts of Brazil for such purposes as to fight the Indians or to break up the so-called Republic of the Palmeiras — an unpleasant congregation of negroes and Indians.

The astonishing success which the dauntless Paulistas had obtained everywhere made them thirst for gold and diamonds, which they knew existed in the interior. They set out in great numbers — men, women, and children — in search of wealth and fresh adventure. Several of the



THE MUNICIPAL THEATRE, RIO DE JANEIRO.



Rio Branco
Petropolis, 24 de Junho 1911.

BARON DE RIO BRANCO.

DAUNTLESS ADVENTURERS

towns in distant parts of the interior of Brazil owe their origin to this great band of adventurers, especially in the section of Brazil now called Minas Geraes. The adventurers were eventually out-numbered and overpowered by swarms of Brazilians from other parts of the country, and by Portuguese who had quickly arrived in order to share in the wealth discovered by the Paulistas. They finally had to abandon the mines which they had conquered at an appalling loss of human life.

The ardour of the Paulistas was quelled but not extinguished. About the year 1718 they started afresh to the northwest in the direction of the Cuyaba River and of Goyaz, where they had learnt that gold and diamonds of great beauty were to be found. So many joined in these adventurous expeditions that São Paulo was left almost depopulated. That is how those immense territories of Goyaz and Matto Grosso were discovered and annexed to São Paulo, but eventually, owing to their size, these became split up into *capitaneas*, then into states.

The Paulistas were great fighters. In 1739 they were able to drive away the Spaniards from Rio Grande do Sul and force them to retreat into Uruguay. After many years of vicissitudes in war and exploration — after phases of prosperity, oppression, and even of almost total ruin, owing to maladministration and official greed — things began to look up again for São Paulo, when the port of Santos was thrown open to the trade of the world, in 1808. The history of Brazil during the last hundred years is too well known to be repeated here.

During the last few years the State of São Paulo has attained amazing prosperity, principally from the export of coffee — perhaps the most delicious coffee in the world. Although nearly all the rivers of the State of São Paulo are absolutely useless for navigation, owing to dangerous rapids, the State is intersected by innumerable streams, large and small, of great importance for purposes of

ACROSS UNKNOWN SOUTH AMERICA

irrigation and for the generation of electric power. The most important harbour in the State is Santos. Ubatuba, São Sebastião, Iguape, and Carranca are ports of less consequence. It is principally from Santos that the exportation of coffee takes place.

The State extends roughly in a parallelogram from the ocean, southeast, to the Parana River, northwest; between the Rio Grande, to the north, and the Rio Paranapanema, to the south, the latter being two tributaries of the Parana River. The State can be divided into two distinct zones, one comprising the low-lying lands of the littoral, the second the tablelands of the interior, northwest of the Serra Cadias, Serra do Paranapiacaba, and Serra do Mar — along or near the sea-coast. The first zone by the sea is extremely hot and damp, with swampy and sandy soil often broken up by spurs from the neighbouring hill ranges. It is well suited to the cultivation of rice. The second zone, which covers practically all the elevated country between the coast ranges and the Parana River, is extraordinarily fertile, with a fairly mild climate and abundant rains during the summer months. During the winter the days are generally clear and dry.

It is in that second zone that immense coffee plantations are to be found, the red soil typical of that tableland being particularly suitable for the cultivation of the coffee trees.

It is hardly necessary here to go into detailed statistics, but it may be sufficient to state, on the authority of the Directoria de Estatistica Commercial of Rio de Janeiro, that during the first eleven months of the year 1912, 10,465,435 sacks of coffee were exported from Brazil — mostly from São Paulo — showing an increase of 548,854 sacks on eleven months of the previous year. That means a sum of £40,516,006 sterling, or £5,218,564 more than the previous year; the average value of the coffee being, in 1912, 58,071 reis, or, taking the pound sterling at

CATTLE BREEDING

15 milreis, £3 17s. 5½*d.* a sack — an increase in price of 4,628 milreis = 6s. 2*d.* per sack, on the sales of 1911.

The other exports from the State of São Paulo are flour, mandioca, cassava, bran, tanned hides, horns, fruit (pineapples, bananas, cocoanuts, abacates [alligator pears], oranges, tangerines, etc.), wax, timber (chiefly jacarandà or rosewood), a yearly decreasing quantity of cotton, steel and iron, mica, goldsmith's dust, dried and preserved fish, scrap sole leather, salted and dry hides, wool, castor seed or bean, crystal, *mate*, rice, sugar, rum (*aguardiente*), and other articles of minor importance.

The area of the State of São Paulo has been put down at 290,876 square kilometres.

Its population in 1908 was calculated at 3,397,000, and it had then more inhabitants to the square kilometre than any other part of Brazil. It is useless to give actual figures of the population, for none are reliable. Although this State is the most civilized in Brazil, yet a good portion of its western territory is still practically a *terra incognita*, so that even the best official figures are mere guesswork.

Owing to the wonderful foresight of that great man, Antonio Prado — to my mind the greatest man in Brazil — a new industry has been started in the State of São Paulo, which promises to be as lucrative and perhaps more so than the cultivation of coffee. It is the breeding of cattle on a gigantic scale, the magnificent prairies near Barretos, in the northern part of the State, being employed for the purpose. Slaughter-houses and refrigerating plants of the most modern type are to be established there, and with such a practical man as Antonio Prado at the head of the enterprise, the scheme is bound, I should think, to be a success. With the population of the Republic gradually increasing — it could be centupled and there would still be plenty of room for as many people again — the São Paulo State will one day supply most of the meat for the principal markets of Brazil. A good

ACROSS UNKNOWN SOUTH AMERICA

proportion of the cattle which will eventually be raised on the marvellous campos of Matto Grosso and Goyaz, and destined to Southern Brazilian markets, will find its way to the coast via São Paulo. The rest will travel perhaps via Minas Geraes.

For some years cattle breeding has been carried on successfully enough, but on a comparatively small scale, in this State. Experiments have been made in crossing the best local breeds, principally the Caracù, with good foreign breeds, such as the Jersey, Durham, and Dutch stocks. Pigs of the Berkshire, Yorkshire, Canasters, and Tatus type are the favourites in São Paulo, and seem to flourish in that climate.

Sheep-breeding is also successful, and would be even more so if proper care were taken of the animals. Of the wool-producing kinds, those preferred are the Leicester, Merino, Oxford, and Lincoln, the Oxford having already produced quite excellent results.

The Government of the State, I understand, is at present giving great attention to the matter, and is using discrimination in the selection of suitable breeds from foreign countries, in order to procure the best animals of various kinds for the production of meat, butter, and hides. I also believe that an endeavour is being made to produce in the State a good breed of horses for military and other purposes.

The elevation of São Paulo city is 2,450 feet above the sea level.

Thanks to the kindness of the President of the Paulista Railway, a special saloon carriage was placed at my disposal when I left São Paulo, and a railway inspector sent to escort me and furnish me with any information I required. I preferred travelling seated in front of the engine, where I could obtain the full view of the interesting scenery through which we were to pass.

The Paulista Railway is interesting, as it was the first

THE PAULISTA RAILWAY

line in Brazil constructed entirely with Brazilian capital. The line was begun in 1870, but since that date several extensions have been successfully laid out. Up to 1909 the lines owned and worked by the Paulista Railway were the 1.60-metre-gauge trunk line from Jundiahy to Descalvado (north of São Paulo), and the two branch lines of the same gauge from Cordeiro to Rio Claro; Laranja Azeda to S. Veridiana; the two branch lines of 0.60 metre-gauge from Descalvado to Aurora and from Porto Ferreira to S. Rita do Passo Quatro. Then they possessed the one-metre trunk line from Rio Claro to Araraquara, with the following branch and extension lines: Visconde de Rio Claro to Jahu; Araraquara to Jaboticabal; Bebedouro to Barretos; Mogy Guasso Rincão to Pontal; S. Carlos to S. Euxodia and Rib. Bonita; Agudos to Dois Corregos and Piratininga; and the loop line through Brotas. Of the total charters for 1,114 kilometres, 261 have been granted by the Federal Government and are under their supervision, whereas 583 kilometres are under charter granted by the State of São Paulo.

The following statistics taken from the last Brazilian Year Book show the wonderful development of the passenger and goods traffic on the Paulista Railway:

Line open.	Kilometers.	Passengers carried.	Goods carried, including Coffee.	Transport of Animals.	Baggage and Parcels.
			Tons.		Tons.
1872	38	33,531	26,150	4,919	—
1890	250	348,150	300,857	5,768	2,613
1908	1,154	1,084,081	959,742	36,072	12,558

At Jundiahy the Paulista Company has extensive repair shops for engines. Formerly they had there also shops for building carriages, but these are now constructed at the Rio Claro Station, partly from material which

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comes from abroad. The rolling stock of the Company is excellent in every way, quite up-to-date, and kept in good condition, almost too luxurious for the kind of passengers it has to carry.

It is principally after leaving Campinas that the scenery of the line is really beautiful — wonderful, undulating country — but with no habitations, except, perhaps, a few miserable sheds, miles and miles apart. At Nueva Odena the Government is experimenting with Russian and Italian labourers, for whom it has built a neat little colony. After a time each labourer becomes the owner of the land he has cultivated. I am told that the colony is a success.

CHAPTER II

COFFEE — THE DUMONT RAILWAY

MY object in travelling by the Paulista Railway was to inspect the line on my way to the immense coffee plantations at Martinho Prado, owned by Conselheiro Antonio Prado. The estate is situated at an elevation of 1,780 feet above the sea level, upon fertile red soil. It is difficult, without seeing them, to realize the extent and beauty of those coffee groves: miles and miles of parallel lines of trees of a healthy, dark green, shining foliage. A full-grown coffee tree, as everybody knows, varies in height from six feet to fourteen or fifteen feet according to the variety, the climate, and quality of the soil. It possesses a slender stem, straight and polished, seldom larger than three to five inches in diameter, from which shoot out horizontal or slightly oblique branches — the larger quite close to the soil — which gradually diminish in length to its summit. The small, white blossom of the coffee tree is not unlike jessamine in shape and also in odour. The fruit, green in its youth, gradually becomes of a yellowish tint and then a bright vermilion when quite ripe — except in the Botucatú kind, which remains yellow to the end.

The fruit contains within a pericarp a pulp slightly viscous and sweet, within which, covered by a membrane, are the two hemispherical coffee beans placed face to face and each covered by a tender pellicle. It is not unusual to find a single bean in the fruit, which then takes the shape of an ellipsoid grooved in its longer axis; and this

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is called *moka* owing to the resemblance which it bears to the coffee of that name.

The coffee chiefly cultivated in Brazil is the *Arabica* L. and to a small extent also the *Liberica* Hiern, but other varieties have developed from those, and there are crosses of local kinds, such as the Maragotype, which takes its name from the place where it was discovered (Bahia Province). Those varieties are locally known as Creoulo, Bourbon, Java, Botucatú (or yellow bean coffee), the Maragotype, and the Goyaz. The Creoulo, the Botucatú, and the Maragotype are wilder and show more resistance than the Java and Bourbon sorts, which are nevertheless more productive under good conditions and with careful cultivation, which the first three qualities do not exact.

The coffee tree is a most serviceable plant, every part of which can be used. Its wood is much used in cabinet work, and makes excellent fuel; its leaves, properly torrefied, and then stewed in boiling water, give a palatable kind of tea; from the sweet pulp of its fruit an agreeable liqueur can be distilled; from its beans can be made the beverage we all know, and from the shells and residue of the fruit a good fertilizer can be produced.

The chemical examination of the cinders of the coffee bean shows that it contains 65.25 per cent of potash, 12.53 per cent of phosphoric acid, 11.00 per cent of magnesia, 6.12 per cent of lime, and some traces of sulphuric and salicylic acid, oxide of iron, and chlorine.

An interesting study has been made by Dr. Dafert of the weight of the various components of the coffee tree at different ages, from which it appears that the proportion of potash increases progressively in the organs as they are more and more distant from the roots. The contrary is the case with lime and phosphoric acid, which preponderate generally in the seeds.

With this knowledge a scientific cultivator can judge

COFFEE

exactly how to treat the exigencies of the different trees at different ages. Naturally, the condition of the soil has to be taken into consideration in any case. According to experiments made by Dr. Dafert, each kilo of coffee beans has extracted from the soil: potash 0.7880 gramme; phosphoric acid 0.4020 gramme; magnesia 0.3240 gramme; lime 0.1470 gramme.

These experiments apply merely to coffee grown in Brazil, and are no doubt at variance with experiments on coffee grown elsewhere. Taking all things into consideration, it has been proved by chemical analysis that the Brazilian coffee comes as near as any in its components to what the normal or perfect coffee should be.

The soil, the elevation of the land, the zone, and the climate naturally have considerable influence on the quality of the coffee. The *Coffea Arabica* seems to feel happy enough in a temperate zone and at elevations from 1,500 to 2,300 feet. The States of São Paulo, Minas Geraes, Rio de Janeiro, and Espirito Santo fulfil most, if not all, these conditions.

The coffee trees can stand cold, if not of long duration, down to freezing-point, as well as a fairly high temperature. Unlike the Liberia coffee, they fare better on undulating or broken ground than on the flat.

Two distinct seasons, the dry and the rainy, each of about six months' duration, such as are found in the above-mentioned States of Brazil, seem perfectly to suit the growth of the coffee trees. The trees are in bloom for three or four days some time during the months of September to December. If the rains are not abundant when the trees are in blossom and during the maturing of the fruits, the latter do not develop properly, especially those at the end of the branches, where the berries become dry before their time or even do not form. If the rain comes too long before the trees are in bloom, it causes the blossoms to open before their time and they are fre-

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quently spoiled by the cold which follows. The coffee beans are collected in April, during the dry weather.

The coffee trees are very sensitive to winds, cold or hot, especially when blowing continuously in the same direction, which causes the undue fall of leaves and rupture of the bark at the neck of the roots. Wind, indeed, is one of the most dangerous enemies of coffee trees, and it is to obviate this danger that in many countries — but not in Brazil — a protecting plantation in lines of other trees, generally useful fruit trees, is adopted, in order to screen the coffee trees from the prevailing wind, as well as to give a further income from the fruit produced.

It has been proved that even from good trees below a certain altitude the coffee is of inferior quality, while above that height the crop becomes irregular. In zones fully exposed to the sun, the quality is superior to that of regions where the sun does not reach or reaches for only a short portion of the day.

The *Coffea Arabica* is not particularly exacting in the quality of the soil, but the soil on which it flourishes best is that formed in great part by decomposed vegetable matter, as, for instance, from ancient trees mixed with volcanic earth, such as the famous red earth of the State of São Paulo. Volcanic cinders also are said to be wonderful fertilizers for the soil, and well adapted to the welfare of coffee trees.

One thing is undoubted, and that is that the State of São Paulo possesses the ideal soil for coffee plantations. Analysis has shown that, curiously enough, the soil of São Paulo is not in itself very rich. It has an insufficient quantity of fertilizing substances, particularly of lime; but it should not be forgotten that locality and climatic conditions must be taken into serious consideration, and that we must not be misled by the difference between the apparent and the real fertility of the soil. What would be a poor soil in Europe may prove to be an excellent

THE SOIL

one in a tropical country. So the famous "red earth" of São Paulo, which in a drier climate would be sterile and unproductive, is there excellent because of its extremely permeable, porous, and powdery qualities.

The special terms used for naming the different kinds of earth suitable for the cultivation of coffee are: *terra roxa* (red earth), *massapé*, *salmorão*, *catanduva*, *terra de areia* (sand earth), *picarra* (stony earth), and *pedreguelho* (stony earth).

The *terra roxa* is an argillaceous, ferruginous earth of diabasic origin, occasionally mixed with sand. It contains salicylic acid, oxide of iron, alumina, phosphoric acid, oxide of manganese, lime, magnesia, potash, and soda.

The *massapé*, originally decomposed gneiss-granitic rock mixed with clay, contains oxide of iron. Its occasional blackness is due to the decomposed vegetable matter it embodies.

The *salmorão* includes in its formation small stones, indicating the incomplete decomposition of the rock from which it originates.

The *catanduva*, which is of inferior quality, is composed of much disintegrated vegetable matter and fine dust.

The names of the other kinds of earth well denote their quality.

One reason why coffee cultivation is so popular in Brazil is because of the general belief that no trouble is required to look after the trees—a very mistaken notion indeed. There is a marked difference between plantations carefully looked after and those that are not. More than usual care must be taken to select the seed for new plantations. The young plants must become strong in a nursery and then be transplanted into proper soil, the prudent distance between trees being generally from nine to twelve feet. For the convenience of collecting the beans and keeping the soil clean, a perfect alignment in

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all directions is necessary. The most suitable month for planting coffee in Brazil, according to the authority of Dr. Dafert, is the month of July.

Great care must be taken of the trees themselves and of the soil around the trees, which must be kept clean and absolutely free from grass. The capillary roots of the trees extending horizontally near the surface of the soil are much affected by the presence of any other vegetation, and by the collection of insects which this produces and harbours. Frost, rain, and the heat of the sun naturally affect the trees more when the soil is dirty than when kept clean. Many of the coffee estates suffer considerably from insufficient labour. The effects of this are quickly visible on the trees. Artificial fertilization is useful, even necessary, after a number of years, and so is careful pruning, in order to keep the trees healthy, strong, and clean.

Coffee trees have many natural enemies, chiefly vegetable and animal parasites, which mostly attack the leaves. The *Ramularia Goeldiana*, a parasite not unlike the *Cercospora Coffeicola*, is one of the worst, and undoubtedly the chief offender in Brazil, although great is the number of insects prejudicial to the trees. The most terrible of all, perhaps, are the ants and termites, such as the *Termes opacus*, which attack and destroy the roots of young trees. The *cupim* (*Termes album*) or white ant, and the *carregador* or *sauba*, a giant ant with which we shall get fully acquainted later on our journey, are implacable enemies of all plants. Also the *quen-quen*, another kind of ant. These ants are so numerous that it is almost an impossibility to extirpate them. Various ways are suggested for their destruction, but none are really effective. Certain larvæ, flies, and cochinita, owing to their sucking habits, deposit on the leaves and branches a viscous sugary substance, which, on account of the heat, causes fermentation known locally as *fumagina*. This

COLLECTION OF THE BERRIES

produces great damage. Birds pick and destroy the berries when ripe; and caterpillars are responsible for the absolute devastation of many coffee districts in the Rio de Janeiro and São Paulo States. Other pests of the *Heteroptera* type attack the roots to such an extent as to cause the death of the trees.

Among the diseases of the trees are the *Aphelencus Coffeæ* and the *Loranthus brasiliensis* — the latter a terrible parasite, which quickly envelops the stem and branches of the tree and ends by killing it.

The collection of the berries is the busiest process in the fazendas, and has to be performed with considerable care, for some of the berries are already ripe and dried when others hidden under the branches have not yet reached the required degree of maturity. An experienced hand can collect from 400 to 450 litres of coffee berries per day. It takes an average of 100 litres of coffee berries to produce 15 kilos of prepared coffee beans ready to be shipped. The crop is not the same every year. After one plentiful crop there generally succeeds one year, sometimes two or three, of poor — almost insignificant — collections, varying according to the care that is taken of the trees and the soil.

When once the coffee has been collected and transported to the fazenda in baskets, blankets, and sheets, it is necessary to remove the skin and viscous, pulpy matter which envelop the beans. This is done partly by maceration in water tanks, and afterwards by drying upon extensive, flat terraces, tiled or cemented, and locally called *terreiro*. The process of drying by machinery has not been adopted in Brazil; principally because of its high cost. The coffee is first placed for some days in mounds on the terraces, until fermentation of the outer skin begins, which afterwards hastens desiccation when coffee is spread flat in a thin layer on the terraces. When once the coffee berries have been freed from their pulpy envelope and

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skin, the desiccation, if the weather is propitious, takes place in a few days. Care must be taken to move the berries constantly, so that they dry evenly on all sides, as perfect desiccation is necessary in order to preserve the coffee in good condition after it is packed for shipment.

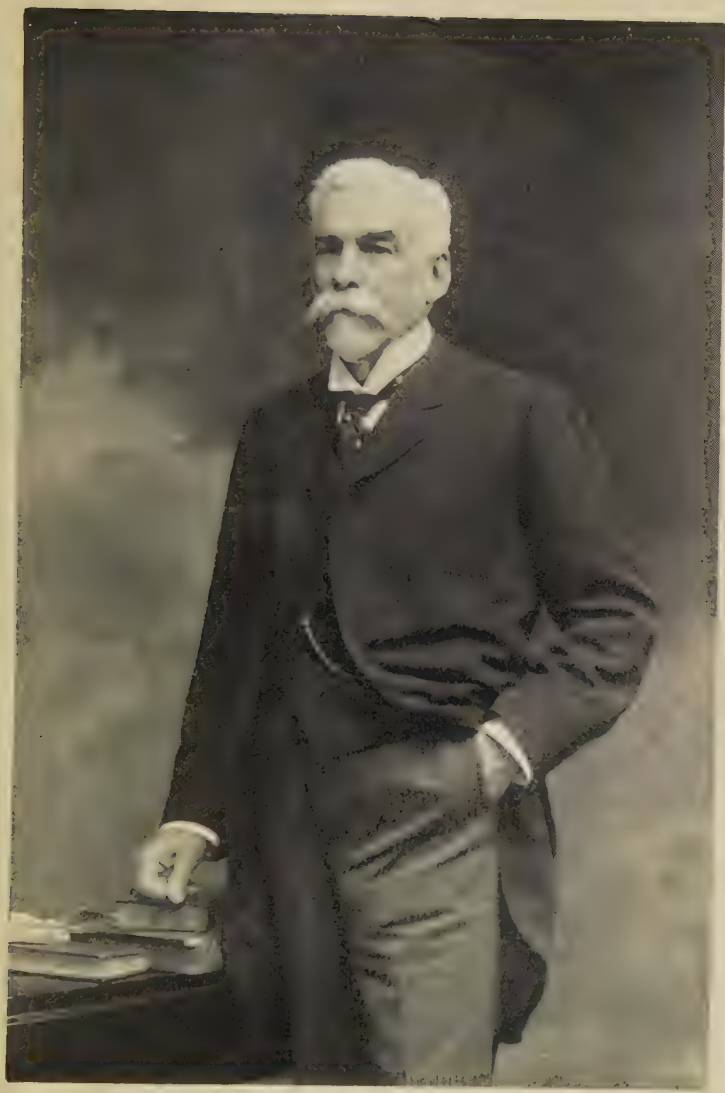
There are two ways of preparing coffee for export: the humid and the dry. In the humid process the berries are placed in a special machine called *despolpadora*, which leaves the beans merely covered and held together in couples by the membrane immediately enclosing them after the skin and viscous, sugary coating have been removed. Those coffees are called in commerce *lavados*, or washed.

The dry process consists in removing part of the pulp and membrane in a special machine and a series of ventilators after the berries have been skinned and dried. They are then quite ready for export.

The preparation of coffee from the drying terraces is slightly more complicated. The coffee passes through a first ventilator, which frees it from impurities such as earth, stems, stones, filaments, etc.; from this it is conveyed by means of an elevator into the *descascador*, where the membrane is removed. Subsequently it passes through a series of other ventilators, which eliminate whatever impurities have remained and convey the coffee into a polishing machine (*brunidor*). There the coffee is subjected to violent friction, which not only removes the last atoms of impurity, but gives the beans a finishing polish. The coffee is then ready for the market.

I spent a most instructive day inspecting the fazenda of Conselheiro Antonio Prado and having things clearly explained by his intelligent overseer, Mr. Henrique P. Ribeiro.

From that place I drove across country for miles and miles, through endless groves of coffee trees, as far as the



DR. PASSOS.



A BEAUTIFUL WATERFALL AT THERESOPOLIS.



ANTONIO PRADO'S COFFEE ESTATE.

COFFEE ESTATES

next great coffee estate, belonging to the Dumont Company, an English concern, with an authorized capital of £800,000, the estates being valued at £1,200,000. It is not often one sees an estate so beautifully managed and looked after in a country like Brazil. The buildings, the machinery, the "drying terraces," everything was in capital order. To indicate on what scale the company does business, it will be sufficient to state that in 1911 the coffee crop amounted to 109,368 hundredweight, which realized on a gross average 56s. 10½*d.* per hundredweight. This crop was not as plentiful as in the previous year, when 110,558 hundredweight were harvested. The gross profit for the year up to June 21, 1911 was £123,811 2s. 5*d.*, which, less London charges, still showed the substantial sum of £119,387 11s. 8*d.* There had been a considerable rise in the rate at which coffee was sold in 1911 — viz., 56s. 10½*d.* per hundredweight as compared with 41s. 8½*d.* the previous year; but notwithstanding the high price, the high rate of exchange, and the cost of laying the coffee down in London — which had risen on the estate by 1s. 11½*d.* and by 1s. 3½*d.* in respect of charges between the estate and London — the Company had been able to earn a profit of 20s. 4¾*d.* per hundredweight.

I was taken round the estate by Mr. J. A. Davy, the general manager, whose good and sensible work was noticeable at every turn. The trees seemed in excellent condition and likely to have a long life on the specially suitable, rich red soil, where sufficient breathing space was allowed to maintain them in good health. The soil was of such unusual richness in that particular spot that no artificial stimulation was required in order to keep the trees healthy and vigorous. One could walk for miles and miles along the beautiful groves of coffee trees, clean-looking with their rich, deep green foliage.

There seemed to be no great difficulty on the Dumont estate in obtaining sufficient labour — greatly owing, I

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think, to the fair way in which labourers were treated. Mr. Davy told me that over an area of 13,261 acres a crop had been maintained which averaged $8\frac{1}{4}$ hundred-weight per acre.

Experiments have also been made on the Dumont estate (at an elevation of 2,100 feet above the sea level), chiefly, I believe, to satisfy the wish of shareholders in London, in the cultivation of rubber, but it did not prove a success — as was, after all, to be expected. It is not easy to make the majority of people understand that coffee grows lustily in that particular part of the State of São Paulo mainly because of the eminently suitable quality of the soil; but it does not at all follow that soil or climatic conditions which are good for coffee are suitable for rubber trees, or vice versa. In the case of the Dumont estate, although the best possible land was chosen and three different varieties of rubber — the Pará, Ceará, and the Castilloa — were experimented with, it was soon discovered that only one kind — the Ceará — attained any growth at all, and this gave very little latex, owing undoubtedly to the nature of the soil and the climate. The cost of extracting the latex was prohibitive. With wages at four shillings a day, a man could collect about one-third of a pound of latex a day. Rubber trees in that region could not be expected to produce more than one-fifth of a pound of rubber a year, so that the cost of collecting and shipping rubber from ten-year-old trees would amount to 3s. 3d. per pound, without counting the cost of planting and upkeep.

By a special train on the Dumont Railway line, I travelled across beautiful country — all coffee plantations — the property of the Dumont Company and of Colonel Schmidt, the “Coffee King,” whose magnificent estate lies along the railway. I regretted that I could not visit this great estate also, but I was most anxious to get on with my journey and get away as soon as possible from

THE COFFEE KING

civilization. It was pleasant to see that no rivalry existed between the various larger estates, and I learnt that the Dumont Railway actually carried — for a consideration, naturally — all the coffee from the Schmidt estate to the Ribeirão Preto station on the Mogyana Railway.

CHAPTER III

ON THE MOGYANA RAILWAY

I ARRIVED at Riberão Preto at 3.45 p.m. on March twenty-ninth. Riberão Preto — 421 kilometres north-northwest of São Paulo and 500 kilometres from Santos — is without doubt the most important commercial centre in the northern part of the State of São Paulo, and is a handsome, active city, neat and clean-looking, with an Italian, Spanish, and Portuguese population of some 25,000 souls. Its elevation above the sea level is 1,950 feet. The people of Riberão Preto subsist chiefly on the coffee industry. There are one or two theatres in the city, the principal being a provincial one. There are several hotels of various degrees of cleanliness and several industrial establishments. Unlike other cities of the interior, Riberão Preto boasts of a good supply of *agua potavel* (drinking water), and the town is lighted by electric light.

The value of land in the vicinity of Riberão Preto varies from 300 milreis to 1,500 milreis for the *alqueire*, a price far superior to that of other localities on the same line, where cultivated land can be purchased at 300 milreis an *alqueire* and pasture land at 100 milreis. An *alqueire* is reckoned at 10,000 square *boças*, a *boça* being about $6\frac{1}{2}$ feet, or a little over two metres.

At Riberão Preto I was to leave the Dumont Railway. Arrangements had been made for me to meet at that station a special Administration car, which was to be attached to the ordinary express train on the Mogyana Railway.

THE MOGYANA RAILWAY

I had been warned at the Dumont estate that a brass band had been sent to the Riberão Preto station, where some notabilities were awaiting my arrival in order to greet me with the usual speeches of welcome. As I particularly dislike public speaking and publicity, I managed to mix unseen among the crowd, which expected to see an explorer fully armed and in khaki clothes of special cut, as represented in illustrated papers. It was with some relief that I saw them departing, with disappointed faces, and with their brass instruments, big drums and all, after they had entered the luxurious special car placed at my disposal and found it empty — I humbly watching the proceedings some distance away from the platform.

Thanks to the splendid arrangements which had been made for me by Dr. José Pereira Rebouças, the President of the Mogyana, I was able to take a most instructive journey on that line, whose Traffic Superintendent, Mr. Vicente Bittencourt, had been instructed to accompany me and furnish all possible information.

A few words of praise are justly due to the Mogyana line for the excellence of the service and the perfection of the rolling stock. I inspected the entire train and was amazed to find such beautiful and comfortable carriages, provided with the latest improvements for passengers of all classes. It is seldom I have seen in any country a train look so “smart” as the one in which I travelled from Riberão Preto to the terminus of the line. The appointments of every kind were perfect, the train ran in excellent time, and very smoothly over well-laid rails. The special car in which I travelled was “palatial and replete with every comfort,” if I may use the stock words invariably applied to railway travelling.

Here are a few interesting points regarding the Mogyana Railway.

By a provincial law (São Paulo) of March 21, 1872, a guaranteed interest of seven per cent on a capital of

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3,000,000 milreis was granted for ninety years, for the construction of a railway of one-metre gauge from Campinas to Mogymirim, and of a branch line to Amparo, to the northeast of Campinas and due east of Inguary. By a similar law of March 20, 1875, a guaranteed interest was granted for thirty years as to the capital of 2,500,000 milreis for a prolongation of the line to Casa Blanca.

By a provincial law (Minas Geraes) of October 1, 1881, another guarantee was granted of seven per cent for thirty years, upon a maximum capital of 5,000,000 milreis, for a continuation of the railway through the provincial territory from the right bank of the Rio Grande to the left bank of the Paranahyba River. Finally, by a provincial contract of Minas Geraes of October, 1884, a further guarantee was granted of seven per cent for thirty years, on a maximum capital of 5,000,000 milreis, for the construction of the prolongation of the railway from its terminal point at the Rio Grande as far as the Paranahyba, via the city of Uberaba.

In view of other important concessions obtained, one may consider that the Mogyana Company is perhaps the most important railway concern in Brazil, up to the present time. It does great credit to Brazilians that the railway was constructed almost entirely by capital raised on bonds in Brazil itself, the only foreign loan issued in London being a sum amounting merely to £341,000 at an interest of five per cent. Between the years 1879 and 1886 the Company returned to the Government at São Paulo the interests received, thus liquidating its debt. A decree of October 18, 1890, fixed the capital spent on the Rio Grande line and a branch to Caldas at 4,300,000 milreis gold and 1,853,857.750 milreis paper, as guarantee of the interest of six per cent conceded by the National Treasury.

In the year 1900 the value of interests received amounted to 3,190,520.418 milreis in paper, and

A BRAZILIAN CONCERN

1,963,787.300 milreis in gold, out of which 544,787.300 milreis were in debenture bonds. On the same date the value of interests repaid to the National Treasury amounted to 1,606,578.581 milreis in paper currency.

The federalized lines of the Company were: from *Ribirão Preto* to *Rio Grande* (concession of 1883); from *Rio Grande* to *Araguary* (concession of 1890); with a total extension of 472 kilometres, and a branch line from *Cascavel* to *Poço de Caldas*, 77 kilometres, the last 17 kilometres of which were in the Province of *Minas Geraes*. The extension from *Rio Grande* to *Araguary*, 282 kilometres, was also situated in the Province of *Minas Geraes*.

Having dodged the expectant crowd at the station unnoticed, I did not go with the Traffic Superintendent, Mr. Vicente Bittencourt, into the luxurious special car as the train was steaming out of the *Ribirão Preto* station, but preferred to travel in front of the engine, so as to get a full view of the beautiful scenery along the line. We went at a good speed over gentle curves rounding hillsides, the grass of which bent under a light breeze. Here and there stood a minute white cottage — almost toy-like — where coffee gatherers lived. On the left we had a grandiose, undulating region — what the Americans would call “rolling country” — combed into thousands of parallel lines of coffee trees, interrupted at intervals by extensive stretches of light green, grazing land. Only now and then, as the engine puffed and throbbed under me, did I notice a rectangle of dried, brownish yellow, where the farmers had grown their Indian corn. These patches were a great contrast to the interminable mass of rich, dark green of the coffee trees and the light green of the prairies.

Near these patches, prominently noticeable in the landscape because so scarce, one invariably saw groups of low, whitewashed or red-painted houses, mere humble

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sheds. Where the land was not yet under cultivation — quite a lot of it — low scrub and stunted trees far apart dotted the landscape.

As the express dashed through villages, goats stampeded in all directions; sleepy women and men looked at the train half dazed, as it went by, and children, with quite a characteristic gesture, screened their eyes with their elbows to protect them from the dust and wind the train produced. I was astonished to notice how many fair-haired children one saw, curious indeed in a population of Latin races and negroes. That golden hair, however, seemed gradually to grow darker, and became almost black in the older people.

Hideous barbed-wire fences gave a certain air of civilization to those parts, but the landscape was nevertheless getting desolate as we proceeded farther north. Except in the immediate vicinity of habitations, one felt the absolute lack of animal life. Only rarely did we see a black bird of extraordinary elongated form dash frightened across the railway line, much too fast for me to identify to which family it belonged.

One could not help being impressed by the immensity of the landscape; endless sweeping undulation after undulation spread before us, but not a real mountain was in sight. It was like a solid ocean of magnified proportions. Just above the horizon-line a large accumulation of globular clouds immaculately white intensified the interesting colour-scheme of greens and yellows on the earth's surface to its full value by contrast.

The large proportion of cultivated land which had impressed me so much in the vicinity of Riberão Preto gradually diminished; and at sunset, by the time we had reached Butataes, only 48 kilometres farther on, hardly any more coffee plantations were visible. Only fields of short grass spread before us on all sides. An occasional bunch of trees, hiding a humble farmhouse, could be

THE CITY OF FRANCA

perceived here and there, but there was no other sign of life upon the immense, silent, green undulations of symmetric curves, not unlike enormous waves of the sea.

Farther north upon the Mogyana line, land seemed to diminish in price considerably. Its quality was not so good, especially for coffee plantations. At Batataes, for instance, 548 kilometres by rail from the coast, prices were cheaper. Good land for cultivation could be obtained at 200 milreis, and campos at 25 milreis an alqueire.

Such low prices were general north of Ribeirão Preto, although naturally they are likely to increase as the country is slowly opened up with new roads and railroads. Away from the railway the price of land was much lower.

One thing that particularly struck the traveller straying in those parts was the poverty of all the minor towns and villages. The industrial development of the larger settlements consisted merely of a distillery of "fire-water" (*aguardente*), or, if the city were modern and up-to-date, of a brewery, the only two profitable industries in those regions.

Batateas, according to Brazilian statistics, was stated to "*deve ter*" ("it should have perhaps") some five thousand inhabitants. The zone around it was said to be suitable for coffee growing; in fact, the municipality possessed much machinery for the preparation of coffee.

At 7.50 p.m. punctually — as she was due — the engine steamed into the Franca station, where the train was to halt for the night. The passenger traffic was not yet sufficiently extensive on that line to allow trains to travel continuously during the twenty-four hours. Passenger trains ran only in the daytime.

I was treated with the greatest consideration while travelling on the Mogyana. Not only was the Administration saloon car, containing a comfortable bedroom, placed at my disposal, but telegrams had been sent all along the line with orders to supply me with anything I

ACROSS UNKNOWN SOUTH AMERICA

required. At Franca, much to my surprise, I found an imposing dinner of sixteen courses waiting for me in the station hotel, with repeated apologies from the proprietors that they could not produce more, as the telegram announcing my arrival had been received late. On no account whatever was I allowed — as I wished — to pay for anything. I was rather interested to watch in the station restaurant the wonderful mixture of people who had assembled: priests, monks, railway porters, commercial travellers — some black, some white, some a combination of the two — all sitting together in a jovial manner, sipping coffee or devouring a meal.

The city of Franca itself, 2 kilometres away from the station, 617 kilometres from the sea at Santos, 528 kilometres from São Paulo, was in the most remote northerly corner of the State of São Paulo, and had a population of 9,000 people or thereabout. The electric light had been installed in the town, and there was a theatre. Much difficulty was experienced in obtaining sufficient water for the needs of the population. In the municipality there existed a number of machines for use in rice and coffee culture, as well as two steam saws, a butter and a sugar factory.

There were several trails — so-called roads — branching off from this town and leading to Borda de Matta, Garimpo das Canoas, Potrocinio do Sapucahy, S. José da Bella Vista, etc.

The climate was healthy and delightful. While I was there, the Fahrenheit thermometer registered 76° at an elevation of 3,450 feet. With a fairly good soil, the municipality could produce cereals in plenty under proper cultivation. Land was cheap enough in that region — 150 milreis per alqueire for good land for cultivation, and 25 to 30 milreis per alqueire for campos.

We proceeded on our journey north the next morning, passing through Indaya, 3,450 feet above the sea level — a settlement boasting of two houses upon the highest

THE RIO GRANDE

point of the railway line in the State of São Paulo. We were nearing the Rio Grande, or Great River, which, flowing in a westerly direction, formed in that region the northern boundary of the State of São Paulo with the State of Minas Geraes. As we came near the river, a greater lack of cultivation was noticeable, with more extensive zones of wooded country, especially in the depressions of the land. The undulations of the landscape were more accentuated as we approached the Minas Geraes province. Clouds hung low in the valleys, and we occasionally went through banks of mist not unlike those of Scotland. At Chapadão the ground was more "*accidenté*"—to use an appropriate French expression—with deep depressions and indentations in the surface soil caused by erosion.

The high land on which we had been travelling between Franca and Igaçaba, the station after Chapadão, gave birth on the west to several important tributaries of the Rio Grande, enumerated below, from south to north: the Rio Salgado, the Rio do Carmo, Riberão Ponte Nova, Riberão Bandeira, Rio da Soledade, Riberão S. Pedro; on the east was the Riberão S. Jesus, also a tributary of the Rio Grande.

As the train sped down the incline towards the Rio Grande, we were treated to magnificent scenery on our right. An isolated hill stood at the bottom of the valley with higher mountains on either side of it, and, beyond, a high, flat-topped plateau. The railway line skirted snake-like along the hillside. The hill-tops were getting more rounded and fairly thickly wooded. As we got to a lower elevation, the isolated hill assumed the appearance of an elephant's back. A grassy valley several miles wide opened up before us.

At Rifaina station we had reached the level of the banks of the Rio Grande, that is to say, 1,950 feet above the sea level. The valley of the river was formed, in this

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case also, by erosion, which had left isolated hills in terraces, one with as many as six distinct terraces, others with rounded backs. All plainly showed in their stratification, which was identical with that of the surrounding elevations, that in former days there stood, where the valley was now, a plateau which had subsequently been gradually eroded by the action of water and wind.

Having crossed the river, we arrived at Jaguará — we were now travelling in the Minas Geraes Province — where a breakfast awaited us of rice, pork, dried beef as hard as leather, omelette with shrimps (a much cherished dish in those parts), beans, mandioca, and coffee. Black railway porters, firemen, and engine drivers all sat round the table and ate heartily, the meal costing two milreis, or about 2s. 8d.

The railway ran almost parallel with the river on the north side round the immense curve which the Rio Grande describes in that particular section. We passed Sacramento elevation 1,850 feet, and, in numerous curves, the railway rose by a gradient of $3\frac{1}{2}$ per cent among hills seemingly worn out by torrential rains into rounded shapes with huge gaps between. We left the Rio Grande, there about a hundred yards wide, with thickly wooded banks and islands. At Conquista we had again reached an elevation of 2,350 feet, but we still continued to rise by a gradient of $2\frac{1}{2}$ to 3 per cent, until a pass was reached from which two exquisite panoramas were obtained. One, particularly interesting, looked over Conquista, with its whitewashed houses — some 250 of them — and red-tiled roofs against the background formed by the rugged sides of the natural cauldron worn in the tableland by erosion.

At 538 kilometres, 2,700 feet above the sea level, a view was obtained of a small coffee plantation, but most of the country around was scantily wooded, grassy in places, barren in others.

The railway, having descended to 2,500 feet, rose

TRAILS

again to 2,900 feet near Paneiras station. Then, through beautiful grazing country, gently undulating, we descended and mounted and went round sweeping curves, which formed in places regular loops not unlike a horse-shoe. Two pits producing a considerable quantity of lime existed some two kilometres from Paneiras. Weak attempts were noticeable here and there at growing coffee. We were now in an eminently wonderful pasture land, getting more and more beautiful as we neared Uberaba, where we found ourselves on almost flat country at an elevation of 2,900 feet, with hardly any trees at all and with a delicious climate. The town of Uberaba, with some 12,000 people, was situated at a slightly lower elevation — only 2,700 feet.

Uberaba was perhaps the most important distributing centre in the western part of Minas Geraes, for many trails branched from that place to various distant points in the farther interior. The most important trail was the one to Sta. Rita do Paranahyba, thence to the capital of Goyaz Province via Marrinhos and Allemão; whence a second trail went to Fructal via Conceição das Alagoas. A third, to Sant' Anna do Paranahyba, going on the whole almost due west, but with great deviations, went almost across South America as far as Pulacayo, in Bolivia, crossing first the State of Matto Grosso in its southern and narrower point via Coxim and Corumba, then all Bolivia, eventually joined the La Paz-Antofagasta Railway line at Uyum (Pulacayo is connected by rail to Uyum), and ended at the Pacific Ocean. Another trail led to Monte Alegre; yet another to Uberabinha — although the railway had already connected that town with Uberaba. This last trail continued, making great detours, to Bagagem, then to Patrocino, from which place it deviated due north to Paracatú. There three ramifications occurred: one to Sta. Lucia, Pyrinopolis, and Goyaz (capital); the second to Jamar-

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ria, Jocaré (on the San Francisco River), and Carrinhan (on the Carinhaha River, a tributary of the San Francisco), and eventually by water to the Atlantic Ocean; the third trail proceeded due east — across the San Francisco River to Montes Claros and Grão Mogol; a fourth, in a southeasterly direction, led to Curvelho and Sta. Lucia, where it met the railway to Rio de Janeiro. Another route proceeded south to Sta. Rita do Paraíso.

The price of land, which was excellent in the valley of the river, in the vicinity of Uberaba was from 30 to 150 milreis per alqueire.

After leaving Uberaba the scenery was magnificent, especially when a storm approached as we were steaming over the Serra de Caracol. Dense black clouds collected and capped the dark green forest of the Serra, while down, down below, on our right, the endless, gently undulating plain of fresh green grass was brilliantly illuminated by a warm, dazzling sun. Most beautiful grazing land, practically going to waste now, we crossed on reaching the highest point of the Serra; grass, grass, as far as the eye could see — quite flat land — but not a head of cattle in sight; in fact, there was no sign of animal life, and a stillness of death, except for the puffing of the railway engine on which I sat. Water, however, did not seem to abound; we could see only a small stream, near which curious-looking patches, or *bosquets* of trees, lay in dark spots on that light green expanse. We were then at an elevation of 3,400 feet amid delightfully cool and crisp air.

At Burity we passed the great route of the cattle dealers from Goyaz and Matto Grosso for Sta. Rita, Passos, and Tres Corações do Rio Verde. At Palestina (845 kilometres from the sea) we were on what seemed an interminable, flat plateau with ideally green grass, and here and there patches of stunted vegetation. Land could be purchased there as low as 10 milreis an alqueire, although the best land cost from 50 to 300 milreis.

THE TERMINUS OF THE RAILWAY

The country was absolutely flat until we reached Sicupira (elevation 3,100 feet above the sea level), where we began to descend to the Rio Uberabinha, whose delightfully clear, crystalline water wound its way through scrub.

At Uberabinha we again came across the wonderful red earth of the Ribeirão Preto district. Situated at an elevation of 3,050 feet stood the little town of some 4,000 inhabitants, about 500 yards from the comfortable and pretty station. Although the land was beautiful, cultivation could not be said to be prevalent. Merely some rice, beans, and Indian corn were grown in small quantities.

From Uberabinha the railway line descended all the time through a thinly wooded country of shrubs and stunted trees; the verdant prairies, so refreshing to the eyes, were left behind, and the country became more broken, though the land was still excellent for agricultural purposes. After crossing a well-constructed iron bridge resting on two masonry pillars and spanning the picturesque rapids of the Rio das Velhas — the river, with its turbid, muddy, nasty-looking water, being there some 80 yards wide, at an elevation of 2,050 feet above the sea level — we again began a steep ascent by a gradient of over three per cent, following most of the time the river course. The thickly wooded banks obstructed a good deal of the view except here and there, where charming glimpses of the water could be obtained.

Seven hundred and eighty-nine kilometres from Campinas, or 982 kilometres from the Atlantic Ocean at Santos, we arrived at the terminal station of the Mogyana Railway at a place called Araguary, 3,150 feet above the sea level, one of the dirtiest and most unpleasant spots on the face of the earth. The termini of railway lines in newly developed countries seem to act like filters. Whatever is good passes through; only the impurities or dregs remain.

CHAPTER IV

THE TERMINUS OF THE RAILWAY — AN UNPLEASANT INCIDENT — THE
PURCHASE OF ANIMALS — ON THE MARCH WITH THE CARAVAN

A GREAT crowd had assembled at the station. The train had hardly stopped when my car was invaded by boisterous people, who embraced me and patted me on the back in the most approved Brazilian style. Before I could inquire who they were, one fellow, more boisterous than the others, informed me that he had purchased a great many mules for me, that he had engaged men for me, and also procured riding and pack saddles, harness, implements, clothing, and bedding for the men he had engaged, and I do not know what else. Everything was paid for. I could return the sum paid out the next day. Another man said he had already prepared a sumptuous apartment for me in the best hotel in the town.

When asked who had instructed them to make such arrangements, they were vague, and on being pressed for an answer gave names of people of whose existence I was perfectly ignorant. Before I could realize what all this meant, I discovered, much to my annoyance, that all my baggage had been taken out of the train and had been conveyed to the hotel. I was therefore compelled to proceed there myself, in the company of my new "friends," who shouted everything they had to say at the top of their voices, so that I should not fail to understand. It was already night, and the streets of the town were in such a terrible condition that the overladen carriage —

A DYING MAN

there were people on all the seats, on the box and standing on the steps — nearly turned over on going round corners. The wheels sank up to their axles in mud.

We pulled up at the hotel door, where another crowd of loafers had assembled. I was literally dragged into the hotel — for I had become somewhat reluctant, first on seeing the appearance of the place, then on being met by waves of a nauseating odour which suggested the non-existence of sanitary arrangements and worse.

“Come in, come in! . . . wait here!” shouted they in a most excited manner, when I expressed a wish to inspect the palatial quarters which they had been good enough to reserve for me.

“Wait a moment!” shouted the landlord, a lumbering, disjointed, murderous-looking creature, whose violent gestures and waving of hands in front of my face were somewhat irritating. He dashed into a room on the ground floor — and we outside could hear an altercation between the loud-voiced proprietor and the plaintive moans of a half-dying man.

A moment later the half-dying man, skeleton-like, with livid eyes, a complexion the colour of a lemon gone bad, and quivering bare legs, was literally dragged out of the bed and roughly thrown out of the door.

“Here is your room!” cried the landlord triumphantly to me, as he flung out of that apartment some cheap canvas bags, clothes, which from the beginning had been innocent of washing and pressing, and the socks, shoes, and day shirt of the guest who had been ejected.

The odour alone, as I peeped into the room, was enough to stifle any one with the sense of scent even less delicate than my own. As for the vacant bed — any pariah dog of any other country would have been offended to be offered such filthy accommodation.

In Brazil, as elsewhere, it does not do to lose one's calm. I also wished to avoid an unpleasant quarrel, as

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I have a belief that quarrels are bad for one's health. I spoke gently and kindly to the hotel-keeper, and said that, although I had ordered nothing, still, as he had kindly reserved that charming apartment for me, I should be very pleased to pay for it, which I would do at once. If he would excuse me, I preferred to go back to sleep in my private car. Upon hearing these words a nasty, tragi-comic scene occurred, which, had I not remained cool and collected, might have ended badly.

"Do you know, sir," shouted the landlord, with livid features and eyes shooting out of their orbits, so enraged was he, "do you know that I am the Chief of Police here, and that everybody is afraid of me? I have only to give orders, and every one will kill any one I like." Here he discontinued shaking his somewhat grimy hands under my nose and, drawing himself up, stood upon the doorstep of the hotel in order to harangue the great crowd which had collected.

"We are all millionaires in Brazil," shouted the landlord, with an effort which seriously impaired the safety of his fully-congested jugular vein. "We are all atheists and anarchists in Brazil. Down with the infamous oppression and slavery of Europe! Down with kings and emperors! Down with Europe, the land of oppression and cruelty!" And again: "We in Brazil are the richest people on earth. We are all millionaires in Brazil. We do not need foreign charity!"

"Down with foreigners!" answered the chorus of assembled natives.

The railway inspector who had been sent by the Company to accompany me became scared at the turn matters were taking, and told me, against the instructions he had received, that I could not now return to the car. Upon hearing this, my new friends, believing they had me in their power, renewed their vocal attack.

I remained some time endeavouring to collect my

A CHALLENGE

baggage, pretending to pay no attention whatever to the absurd oratory. To this day I cannot yet grasp what the oppression of Europe had to do with my wanting to pay for something I had never had. I then repeated my offer, which was again refused. With the protection of his strong rear-guard the Chief of Police advanced bravely towards me, holding in a suggestive manner with his right hand the pommel of his revolver in the back pocket of his trousers. In a tragic manner he exclaimed:

"We will settle this matter to-morrow."

"We will settle it at once," I placidly replied.

"No, to-morrow," he repeated, with a vicious look.

"Very good: at what time and where?"

"At ten o'clock," he eventually grunted, after I had repeated the above question four times.

I also politely invited all the others present to come forward if they had any claims to square. I was quite ready to settle anybody at any time and anywhere. Perhaps they might get more than they wished.

I departed with my baggage laden on two carriages and a cart, and eventually found accommodation at an equally filthy hotel near the station, only the latter place was kept by a humble and honest, decrepit old woman. I do not know that I have ever spent a more miserable evening anywhere. I do not mind roughing it in the roughest way possible, but I have always detested pretentious efforts at civilization of an inferior kind. Thus I sat before a meal of eggs, beans, and rice, all soaked in *toucinho* (pork fat), which I detest and loathe. I watched black railway workmen and porters stuffing themselves with food in a most unappetizing way, and making disgusting noises of all kinds.

Fortunately I remembered that a friend of mine, a railway contractor, Mr. Louis Schnoor, must be at that time in Araguay, looking after the construction of the new railway line which will eventually join Araguay to

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the capital of Goyaz. I went in search of him, stumbling along the terrible roads with deep holes and pools of water and mud. As luck would have it, I was able to purchase from him, that very same evening, a number of excellent mules, which he very generously offered to place at my disposal without payment. Also he promised to supply me with two reliable men — a job not at all easy in that particular part of Brazil.

Mr. Louis Schnoor, a Brazilian of German extraction, was a godsend to me. Thanks to him, I returned that night quite happy to the miserable hotel. Happy, because in less than half an hour I had arranged to leave that pestilential hole the following day. Mr. Schnoor had kindly promised that he would send me, at eleven o'clock the next morning, in a special train to the end of the line in construction, some 45 kilometres farther north. In a town of gentle folks like Araguay, the luxury of sleeping with one's window open could not be indulged in, especially as nearly all the houses were one storey high. So the night was rendered particularly oppressive and long, tormented as I was in bed by its innumerable inhabitants, which stung me all over. I had taken the precaution to spread a waterproof sheet under my own blankets on the bed, but that, too, proved ineffective. Mosquitoes were numerous.

No sanitary arrangements to speak of existed in Araguay, so that everything was flung out of the windows into the streets, which made walking about the town most objectionable. The odour everywhere was revolting, as can well be imagined. The city was nevertheless considered by the natives as all that is most perfect in the way of civilization, for not only did it possess a few anæmic electric lights, so far apart as to be a nuisance instead of a help in seeing one's way about, but also, behold! it actually boasted of a spasmodic cinematograph. There were some 500 houses, all counted, at Araguay, all



THE STATION AND SHED OF THE GOYAZ RAILWAY (ARAGUARY).
Mr. Schnoor and his two engineers.



TYPICAL TREES OF THE BRAZILIAN FOREST, GOYAZ.
The trunks are devoid of branches and foliage up to a great height.



AUTHOR DEPARTING FROM MORRO DA MEZA.
Showing costume worn during the expedition.



ALCIDES.

FILIPPE THE NEGRO.

CHIEF OF POLICE

more or less miserable-looking, and a population of some 2,500 souls — “lost souls,” I should think.

Slowly, very slowly, came the next morning, March thirty-first. At ten o'clock sharp I called on the Chief of Police at his hotel, and found that he had departed early in the morning and was not to be expected back for some hours! A charming way of keeping an appointment which he was so anxious to bring about.

In the company of Mr. Louis Schnoor I also called on the persons who said they had made arrangements for my expedition, as I did not wish to have any misunderstanding in the matter. Far from having purchased mules, horses, saddles, and harness, they could produce nothing on demand, and finally asked me to remain in Araguay for one month — fancy one month in Araguay! — so that they could produce their purchases.

As I was driving in Mr. Schnoor's carriage we met, a long way from his home and hotel, the Chief of Police and hotel proprietor. I immediately dismounted and informed that gentleman of my visit at the appointed time. I also demanded that whatever he wished me to settle must be settled at once.

“Nothing at all,” said he, shaking me warmly by the hand. “You owe me nothing. It was all a mistake. It was all a mistake. Please do not think of it any more. You owe me nothing, nothing, nothing. If I can be of use to you, pray order me! I am your humble servant.” And his delightful politeness was such that I could hardly realize it was the same vicious man of the previous evening. In my surprise I had to turn to Mr. Schnoor to inquire whether I had got hold of the wrong man.

Yes, indeed. Some of those fellows of Central Brazil were a remarkable mixture of villainy and charm; in chemical language one might describe them as sublimates of rascality and delightful manners.

However, good manners or not, I had taken such a

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dislike to the place that I was glad when eleven o'clock came and Mr. Schnoor conveyed me to the special train — an engine and one car. I inspected the new station of the Goyaz Railway, which was already finished, a useful, well-constructed building, quite sufficient for its needs. In the company of Mr. Schnoor, his chief engineer, Mr. Schirmer, and Mr. Bertoux, we left Araguary — oh, what a relief! — for the end of the line, 45 kilometres away. I had decided to wait there, in the open country, the few hours which would be necessary to collect the men who were to accompany me, and the mules.

The work on that portion of the Goyaz line which was already laid had been well and quickly done. Mr. Schnoor assured me that in four or five months more they expected to run trains to Catalão. An iron bridge will eventually be built across the Paranahyba River, within a short distance of which the line had already been laid when I was there. Some delay had been experienced in making a deep cut on the south side of Paranahyba Hills, where the strata had been found much harder than expected.

I camped for a day and a half at Morro da Meza, a lovely spot at an elevation of 2,850 feet, from whence an immense panorama could be enjoyed. What a relief this heavenly place was after Araguary, and how everlastingly grateful I shall be to my friend Mr. Schnoor for having deposited me there!

I took the opportunity of the solitude to rearrange my baggage. On April first my good friend Schnoor reappeared to see that all arrangements were satisfactory for my departure.

Morro da Meza will ever remain present in my mind, for it was my jumping-off place into the wilds. It was from there that the actual marching on horseback and on foot began, and it was there I last saw a railway train for the best part of a year.

A PISTOL SHOT

On April first at 4 p.m., I left Morro da Meza, went through the new railway cut in preparation, crossed the Paranahyba River (at an elevation of 1,970 feet above the sea level), and made my camp on the opposite side of the stream at Anhanguera elevation 2,100 feet above sea level) in the railway engineers' camp, 800 yards away from the water. The engineers, an Italian, Mr. Schnoor's father-in-law, and a Russian, a Mr. Martens, showed me every possible civility. A curious incident occurred while we were having dinner. The day was a holiday, and the workmen on the line were resting. We were sipping our coffee, when a man entered our hut and said a companion of his had been shot. We rushed to see him, and we found that the poor wretch had had his skin perforated in eight different places by the same bullet. What was more remarkable was that each perforation was close to a dangerous place in the man's anatomy, and yet not a single wound was mortal. This is how it happened. The man was lying down in his suspended hammock, resting his left hand on his left knee. A friend came along to show him a new automatic pistol he had purchased. In the usual silly fashion he had pointed it at the man. The pistol went off, and the bullet passed just under the skin at the knee, at the side of the knee-cap, and having come out again, went right through the soft part of the hand between the thumb and index finger. It then perforated the arm at the biceps, and further entering the chest, shaved the heart and came out at the shoulder-blade, continuing its flight beyond to where no one could find it again. That spoke highly for the penetrating power of bullets from automatic pistols, and also for the little harm those little bullets may inflict. After we had carefully dressed his wounds, the man looked, perhaps, a little miserable, but he was able to depart on horseback carrying a bottle of medicine under his good arm.

The Goyaz Railway was making rapid progress. The

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rails were soon to be laid on the north side of the river as far as Catalão. The bed of the railway was fast being made ready.

It was not until April third that I was able actually to make a start with my caravan. Mr. Schnoor had promised me two men — Alcides Ferreiro dos Santos and Filippe da Costa de Britto: the first a German Brazilian of a violent, revolutionary temper but of extraordinary bravery; the other a pure negro of a boisterous, simple nature, and also of indisputable bravery in moments of great danger. These two men, both natives of Araguary, proved themselves to be the two best men I possessed on that fateful expedition. Thus, if nothing else can be said in praise of Araguary, it must be said in justice that it can produce some men of great courage and faithfulness — a boast which cannot well be applied to many places in Brazil.

On April third, at 9 a.m., after a touching farewell, I left the engineers' camp, mounted on a magnificent mule that Mr. Schnoor had insisted on lending me as far as Goyaz, with the pack animals which I had purchased. I did not follow the principal road, which went by a somewhat circuitous route from Araguary to the capital of Goyaz via the towns of Catalão and Bomfin, but preferred to travel across country by a short cut, which took you there in an almost direct line in a northwesterly direction. On getting over the Serrinha (elevation 2,250 feet), a hill range, one obtained a gorgeous view of the valley of the Paranahyba River — a river which, already of good width there, became eventually the great Parana. On the right bank of the river, near its mouth, some thousands of miles from where we were, Buenos Aires is situated.

Going through a beautiful forest in undulating country, we reached the summit of a flat-topped tableland, 2,500 feet above the sea level, with a gentle slope

A WONDERFUL SUNSET

towards the north, where the edge of its summit was some 50 feet lower than on the south. The vegetation was somewhat stunted, but interesting, for many were the trees I noticed which could be put to some use or other. The Barbatinão (*Stryphnodendron bar M.*) was plentiful, and could be used advantageously in tanning leather; the Pao de ferro (*Cæsalpina ferrea M.*) and the Paneira were present in quantities.

Through the forest we descended, in three hours, to the Rio Virissimo, which, swollen by the sub-tributaries Barrocas, Indaica, Pirahitinga, and Perobas on the east and Vae Vem on the west, throws itself into the Parana-tinga between Morro Alto and Porto do Barreiro. That stream had been bridged over. We had descended to 2,000 feet. During the entire distance — we had travelled some 23 kilometres from the Paranahyba River — we had passed only two miserable sheds, and we had not met a single soul, barring a glimpse at a shaggy female who happened to be opening the door of her hut as we were passing, and banged it shut with a yell of terror and bolted it, as she perceived us riding by.

A peculiar kind of wild fig-tree was to be seen, ball-like in appearance, with branches inclined down instead of skyward, like most trees. On our right, as we proceeded down to the farms of S. Jeronymo and Sta. Barbara (elevation 2,400 feet) stood a mountain with beautiful grazing land upon its slopes. Healthy, fat cattle, in most wonderful condition, testifying to the excellence of the grazing in that region, were bred by the farmers. To the north, northeast, and northwest behind this place were to be seen delightful green, round-topped hills, also with excellent grazing. A few cows and imported zebus were to be seen, it is true, but the country could support a million times that number and more.

It was that evening that I noticed for the first time in Brazil a peculiar and most wonderful effect of light at

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sunset — not unlike an aurora borealis. White, well-defined radiations shot skyward from the west, where the sun had set, and stood out luminously against the dark blue sky, like the spokes of a gigantic wheel. This effect, as we shall see, was repeated frequently at sunset, and sometimes was even more beautiful than on the occasion of my first acquaintance with it.

We marched $39\frac{1}{2}$ kilometres that day, with my nine pack-mules, Formosa (which in Portuguese means "beautiful"), the splendid white mule I rode, and three other mules ridden by my men. It was a real pleasure to see the appetite of the animals when we made camp. How joyfully they ground with their powerful jaws the Indian corn which each had received in a nose-bag soon after we had halted, removed the loads and saddles from their backs, and properly groomed them!

When we started the next morning, we went through most beautiful grazing land for some 20 kilometres, and through marvellous grassy slopes on the mountains beyond. Streamlets of clear, abundant water were passed. From 2,050 feet, the elevation of the stream, we rose to 2,650 feet, then descended gradually to the village of Corumbahyba, with its brand-new, red-tiled roofs and whitewashed houses — very tiny, and, with one exception, all one-storied. The windows and doors were gaily decorated with bright blue paint. There was a church, of course, on one side of the large square smothered in high grass, and by the church two wooden pillars supported a beam from which hung a bronze bell. Then in the centre of the square stood the thing most prominent in the village — a huge wooden cross in a dilapidated condition. What little life seemed to exist in the place was to be found in the local store, where an inquisitive crowd had collected when I arrived.

My mules were let loose to graze in the square, joining a number of cows that were already there. As I sat in

A WORN-OUT RACE

the shop, closely examined by the inhabitants, I returned the compliment by analysing them. What a strange, dried-up, worn-out appearance young and old presented! What narrow, chicken-like chests, what long, unstable legs and short arms! And, dear me! what shaggy, rebellious hair, which stood out bristle-like in all directions upon their scalps! Yet those people came from ancestors who must have been, centuries ago, magnificent types of humanity, to be able to accomplish what they did in the way of colonization. With the habit we possess of looking for finer, healthier specimens of humanity in the country than in the cities, this condition of affairs came somewhat as a surprise to me, since that rule generally applied to most nations I have visited except Brazil. Those people, partly by constant intermarriage among themselves, partly by the mixture of black blood with the white, and largely owing to the effects of the most terrible complaint of the blood in existence — universal in Brazil — partly, too, by the dull, uninteresting, wasted lives they led and the poverty of their nourishment, were reduced to a state of semi-idiocy. The men seemed to have hardly the strength and energy to walk or even stand up, although I must confess, to my regret, that they had not yet lost the power of talking.

Their features were unattractive. Eyes were wide apart and widely expanded, so that the entire circle of the iris was exposed, although the eyeball itself was not *à fleur de tête*, but rather sunk into excessively spacious orbital cavities in the skull. The part of the eyeball which is usually white was yellow with them, softened somewhat by luxuriant eyelashes of abnormal length. In fact, the only thing that seemed plentiful and vigorous with them was the hair, which grew abundantly and luxuriantly everywhere, just as bad grass and weeds do on uncultivated or abandoned lands. There was a lot of hair everywhere: on the scalp, on the eyebrows, on the men's

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unshaven cheeks, on the chest, the arms, hands, and the legs. It is, I believe, a well-known fact that hair is generally more luxuriant, the weaker and more anæmic the subject is — up to a certain point.

Deep grooves and hollow cheeks, the latter due to absence of teeth, marked the faces of even young men. One of the most noticeable peculiarities was the extraordinary development, prominence, and angularity of the apple of the throat. The ears, which to my mind show the real character and condition of health of a person more than any other visible part of his or her anatomy, were large and prominent, occasionally well-formed, but lacking colour and the delightful, well-chiselled, vigorous curves of healthy, normal, intelligent people. The hands and feet were generally small and well-shaped, in wonderful condition — though not necessarily clean — owing to the inborn reluctance which all the people of Brazil have for manual labour.

It has always been my experience that, generally speaking, malformed people possess distorted brains, which does not mean at all that the brain of a malformed person may not perhaps develop in a marvellous manner in one particular direction. What I maintain is that, with few possible exceptions, the brains of malformed people are seldom perfectly balanced. As for these particular subjects, it did not take a deep student of human nature to set down the entire crowd of them as visionaries, most fantastically inclined, in which direction, having no restraint whatever, they ran absolutely amuck.

Yet there was something very charming about the people of the interior of Brazil, after they had overcome their first suspicion of strangers and their own shyness. They seemed imbued with the idea that everybody came there specially to do them harm. They lived in a constant state of fear and trembling, even of their own relations and friends. They all went about armed to the teeth, and

CORUMBAHYBA

would not dream of going a yard outside their homes without a revolver, a rifle, and a dagger. Even to walk about the village the men were all armed.

When not in a rage or sulky, which seemed to be their almost constant condition, they were the most good-hearted people I have ever met; gentle, affectionate—in fact, so sentimental that it became a positive nuisance. If one learnt how to deal with them, which was not always easy, they were really delightful people in their enviable simplicity.

A reflection of the people's mentality was to be discovered at a glance in examining the articles that were for sale in the only shop in the village. There, remember, you were in a country which, from an agricultural point of view, could be made of immense value. Now, did you notice any implements in the shop which suggested agricultural pursuits of any kind whatever? No; what you found were patent leather dress shoes, elaborately embroidered top-boots, fancy neckties, gaudy gilt and silver spurs of immense size, bottles of powerful perfumes, fancy soaps, mirrors, combs, and highly-coloured calicoes, beer, fire-water, and other such articles of luxury.

The Corumbahyba village stood at an elevation of 2,250 feet, in a hollow surrounded by low hills. The water was delicious at that place.

As I was getting through my lunch, which I enjoyed thoroughly after my morning march of 23 kilometres, I saw, crossing the square, two murderers laden with iron chains, led along with a rope by two mounted men. The natives present laughed as they saw the poor devils struggle along. Not a sign of pity or care was shown by anybody present.

After leaving Corumbahyba, we witnessed a panorama of magnificent mountain scenery from a height of 2,550 feet, to which we had ascended. Then came a steep and rugged descent through a forest down to a streamlet

ACROSS UNKNOWN SOUTH AMERICA

(2,250 feet); then up another ascent to 2,350 feet, and down again to 2,050 feet at the great Corumbá River, there 300 yards wide. We crossed this beautiful stream — animals and all — on three canoes joined together, upon which a platform had been built.

CHAPTER V

TRAVELLING ACROSS COUNTRY — A MUSICAL GENIUS — VALUABLE WOODS
— THERMAL SPRINGS

AT the river were several picturesque, two-wheeled carts, waiting to be ferried across. Drawn by ten, twenty, and even as many as thirty oxen, these heavy, hooded vehicles travelled across country in a most wonderful manner. Naturally they had to be of solid construction to stand the wear and tear demanded of them. Their wheels were heavy, solid discs of hard wood, encircled by powerful tyres of iron. A primitive system of brake — a mere bar of wood held in position by ropes — retarded the speed of the vehicle down extra-steep declivities. When going up or down hill, the friction of the wheels upon their axles produced a continuous, shrill whistle, which, when heard from a distance, sounded not unlike the whistle of a locomotive. In the deathly stillness of the Goyaz landscape, those whistles could be heard a long way off. The expectant farmers — expectant, because those trading carts conveyed to them a good deal of the food-stuff, salt, and other necessities of life, as well as the luxuries they could afford — were clever at recognizing the whistles of the various carts, and they identified one special cart or another by what they poetically called the “voice of the wheel” or the “song of Goyaz.”

There were some picturesque rapids just above the spot where we crossed the Corumbá River, which flowed in a tortuous channel with a general direction of west-southwest.

ACROSS UNKNOWN SOUTH AMERICA

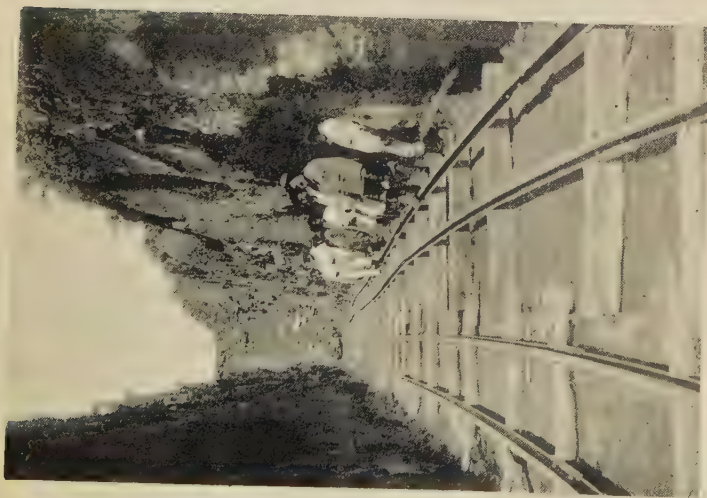
To the east of our track, as we proceeded northward, stood a glorious range of hills, with magnificent grazing land extending for many miles. In front of us to the north and north-northeast towered a high plateau, the Serra de Callos, also called, I believe, Serra do Cusuzeiro.

After travelling up and down and across several streamlets, we reached at sunset the Rio Boccagna (2,230 feet above the sea level), which, soon after passing the place where we crossed it, entered the large river Bagri, winding its way through a gorgeous forest. During the day we had passed really wonderful grazing land on either side of the track, but principally to the east, between the north bank of the Corumbá River and Camp Mazagan. There were plenty of small streams in the hilly and sometimes slightly wooded valleys.

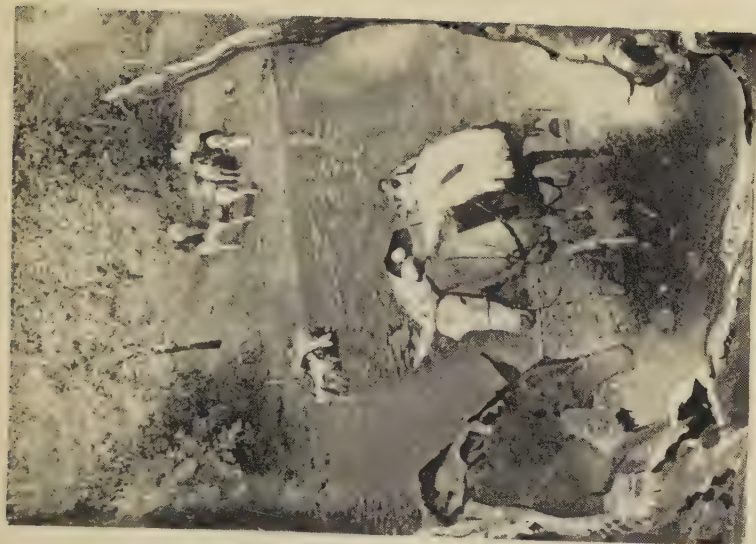
At seven o'clock, having ridden that day 76 kilometres, we halted after dark at the *moradoria*, or farm, of Mazagan (elevation 2,375 feet above the sea level). We were politely asked to enter the house, and immediately preparations were made to clear out the best room for me. The illumination was not grand: an ancient metal arrangement, not unlike a Pompeian lamp, with a wick soaked in oil, profusely smoking. In the dim light I could just distinguish in the background, reclining against the wall, a youth with a guitar, from which two chords — always the same two chords — were strummed. The boy seemed in a trance over this musical composition, and even our appearance did not disturb his efforts. He took no notice whatever of us. Dinner was prepared — it took a long time — the musician all the time enchanting his admiring family with the two monotonous chords.

"It is a pity," said his delighted mother to me, "that we cannot send him to school. He is a genius; he would astonish the world."

"Yes," I hastily agreed, "it is a pity you cannot send him . . . somewhere!"



GOYAZ RAILWAY IN CONSTRUCTION.
The cut leading to the Parahyba River.



AUTHOR'S CARAVAN CROSSING A STREAM.



CHARACTERISTIC TYPES OF BRAZILIANS OF THE INTERIOR.
Notice degenerate faces and development of goitre.



A TYPICAL VILLAGE OF GOYAZ PROVINCE.

A MUSICAL GENIUS

“Can you not take him with you?”

I explained to the poor woman that it required very civilized people to appreciate her son's music. Among the wild Indians I expected to find, later on in my journey, I was sure that, with music like that, we should all be killed; they were such savages!

After two solid hours, the two chords still continuing, with no signs whatever of relenting, I asked the musical genius if he could treat me to a different tune. Alas! he knew no other, but as he saw that I was so fond of music he would again, with the greatest pleasure, go on playing the same air; he called it an air.

“*Muito obrigado!*” (“Thank you very much!”) I moaned, with a sickly smile on my lips and a violent wish to smash guitar and guitarist.

“*No hai de que!*” (“Do not mention it!”) and here recommenced the repetition of the two chords.

“I should like to go to sleep now; thank you very much again for the lovely music,” I next plaintively added, in my most approved Brazilian politeness.

“Oh, not at all: I shall go on playing while you are sleeping. It will give you pleasant dreams!”

It was too pathetic. Nothing short of murder could have stopped his enthusiasm. Being a traveller of years' experience, I was not to be outwitted. As he would not stop the music, I stopped hearing it by stuffing my ears tight with cotton-wool. So I slept soundly enough, notwithstanding the orchestral entertainment. At sunrise, when I opened my eyes again, the boy was still at it. I removed the cotton from my ears . . . yes, indeed, the identical two chords!

The boy and the guitar will perhaps never know what a narrow escape they both had! In despair I gave orders to get the mules ready at once, in order to depart immediately.

Those halts in farmhouses were dreary beyond words.

ACROSS UNKNOWN SOUTH AMERICA

The Brazilians of the interior, quite unlike those of the big towns in or near the coast, were sullen people, with no conversation — or else too much — no interest in anything, no art, no imagination. They were timid and vain to an incredible degree, suspicious, avaricious, and easily offended, so that the greatest tact had to be used with them. They were ignorant of everything even in their own immediate neighbourhood. Yet, mind you, with all that, extraordinarily kind and ultra-polite of speech. They all seemed turned out of the same mould. When you had seen one, you had seen them all. There were, of course, a few exceptions, Brazilians of recent German, French, Italian, or Spanish origin, but these exceptions were indeed very rare in the interior.

Ill-fed, his blood corrupted and impoverished to the utmost degree, his health, therefore, never in a normal condition, his finances at the lowest ebb, the Brazilian of the interior had little indeed to make him happy. His home at best was as miserable and dirty as possible. The room generally given to an honoured guest, the best in the house, was the granary. More than once was my camp-bed perched on a mound of Indian corn. And the furniture? A wooden bench of the roughest description, really an instrument of torture rather than an article of comfort; a few wooden pegs in the wall on which to hang rifles or other things; an occasional wooden bedstead; seldom, very seldom, a stool or a chair, in any case, never a comfortable one, such as you invariably find with peasants and old-established colonists of most other countries. They cared not for comfort. Their beds, a mass of rags, were shared by masters and hens and dogs. Everything was in an abandoned state; everything had fallen to rack and ruin. All looked as if they were tired of life, too indolent to move. They seldom saluted when you met them on the trail, nor when you entered their houses; if they did, they rapidly touched their dilapidated hats as

UNCOMFORTABLE HOMES

if afraid to spoil them. Never did you perceive a smile upon their long-drawn countenances. When they greeted one another, they laid their bodies close together as if about to dance the *tango*, and patted each other repeatedly on the shoulder-blades, turning their heads away as if to avoid their reciprocal evil odour. It is not the fashion in any part of Brazil to shake hands. Some say it is because of the unpleasant feeling of touching sweating hands; others suggest that it is to prevent the contagion of the many skin complaints from which people suffer. When they do shake hands, with a stranger, for instance, one might as well be grasping the very dead hand of a very dead man; it is done in so heartless a manner.

For a consideration they reluctantly gave a stranger what little they possessed, but they had not the remotest idea of the value of things. In one farmhouse you were charged the equivalent of a few pence for an egg or a chicken; in the next farm a small fortune was demanded for similar articles of convenience. Men, women, children, dogs, pigs, and fowls, all lived — not happily, but most unhappily — together.

No sooner were we able to saddle the animals and pack the baggage and pay our hostess, than we tried to make our escape from that musical farm. But luck was hard on me that day. One mule was lost, and a second received a terrible gash in his hind quarters from a powerful kick from another mule.

We went on among low, fairly grassy hills to the west, west-northwest, and to the east of us. We still had before us the Serra de Callos — a flat-topped tableland some 12 kilometres in diameter on the summit, where it was almost circular. Its deeply grooved sides showed clearly the great work of erosion which had occurred and was still taking place in those regions. With the exception of two spurs, which projected on the west and east sides of the plateau, its sky-line was quite clean and flat.

ACROSS UNKNOWN SOUTH AMERICA

After rising to an elevation of 2,600 feet, then descending to 2,450 feet, we crossed two streamlets which afterwards joined a fairly important torrent. One was called the Rio Boa Vista. We then gradually rose to 2,750 feet on another flat tableland to the east of the Serra de Callos, with its sides eroded in two distinct terraces, the higher one being almost a straight wall from two thirds up the side of the range. In the lower portion a number of rounded mounds were to be observed, which, by a stretch of the imagination and for the sake of comparison, resembled, perhaps, elephants' heads.

Northeast of the Serra stood a thickly wooded, detached mound, while to the north, as we went along, there was displayed before us a magnificent view of the flat valley into which we were about to descend.

Where the country was wooded, many trees and plants were to be found, useful for their tanning, medicinal, oleiferous, or lactiferous qualities: such as the Dedal, a yellowish-leaved shrub from which a yellow dye can be obtained; the tall, thin Arariba Amarelho, or Amarelhino (*Centrolobium robustum*), a great number of Lobelia trees, with their elongated, light green leaves and clean, barked stems, which eject, from incisions, a caustic and poisonous juice. The tallest of all the trees in that region was perhaps the Jacaranda, with its tiny leaves. . . . There were four kinds of Jacaranda — the Jacaranda cabiuna, rosa, tan, and violeta, technically known as *Dalbergia nigra*, *Machærium incorruptibile*, *Machærium cencopterum*, *Machærium Alemanni*, Benth. The three latter have a specific gravity higher than that of most woods in Brazil, except the Pao de ferro (*Cæsalpina ferrea*), the very plentiful Barbatimao (*Stryphnodendron barbatimao*), a mimosa-like tree, and the Vinhatico amarello (*Echyrospermum Balthazarii*), the last of which has the highest specific gravity of all.

Then we found plenty of Sambaiba, an excellent wood,



PICTURESQUE OX-CARTS OF GOYAZ.



A HOME IN CENTRAL BRAZIL.



A CLEVER AUTOMATIC POUNDING MACHINE.

CALDAS

and Imuliana, a wood of great resistance, much used in certain parts of Brazil for constructing fences.

A peculiar tree, with concave leaves shaped like a cup, was locally called Ariticun or Articun. It produced a large fruit, quite good to eat.

Much botanical variety was indeed everywhere around us. . . . There was the *terra da folha miuta*, which, as its name tells, possessed minute, shiny leaves; then the tall Faveiro (*Pterodon pubescens*), producing a bean, and having dark leaves not unlike those of mimosas. Then, many were the kinds of acacias we noticed, as we went along.

Still descending, we arrived at the little town of Caldas de Goyaz, so called because there were three hot springs of water of different temperatures. I visited the three springs. The water tasted slightly of iron, was beautifully clear, and quite good to drink. Two springs were found in a depression some 150 feet lower than the village, viz., at an elevation of 2,450 feet, whereas the village itself was at 2,600 feet. These two springs were only 20 feet away from a stream of cold water. A short distance from the cold stream another stream of hot water emerged from the rocks.

Small rectangular tanks had been made at the two higher springs, which were said to possess wonderful curative qualities for eczema and other cutaneous troubles; also for rheumatism and blood complaints of all kinds. Whether those waters were really beneficial or not, it was not possible to ascertain on a passing visit. I drank some of the water and it did me no harm, so if it does no good, neither is it injurious.

The village of Caldas showed signs of having seen better days. It was clean-looking, but like all other villages of Goyaz it was dreary in the extreme. There were only a few houses in the place, and each had a shop; all the shops sold similar articles: nickel-plated revolvers,

ACROSS UNKNOWN SOUTH AMERICA

spurs and daggers, calicoes, gaudy wearing-apparel, perfumery, and so on.

For any one interested in the study of the effects of erosion on a gigantic scale, no more suitable country could be found than Central Brazil. Here again to the east-northeast of Caldas stood the Serra do Sappé. In this case it was not a tableland, like the Serra de Caldas, but purely a hill range. The plateau of Serra de Caldas, I was told, measured on its summit 12 kilometres by 18 kilometres.

Again, after leaving Caldas, we went through most wonderful grazing ground to the northeast and east of our route, at the foot of the Serra do Sappé. We had descended to the Rio Lagiadi, 2,480 feet above the sea level, which flowed into the Pirapitinga River (a tributary of the Corumbá). Once more did we admire, that evening, the remarkable effect of solar radiation, this time a double radiation with one centre — the sun — to the west, and a second centre, at a point diametrically opposite, to the east. Those radiations, with a gradually expanded width, rose to the highest point of the celestial vault, where they met. The effect was gorgeous indeed, and gave the observer the impression of being enclosed in the immeasurable interior of an amazingly beautiful sea-shell, turned inside out.

We arrived in the evening at the farm of Laza (elevation 2,450 feet), where we had to abandon the wounded mule, and also another which, on coming down a steep incline, had badly injured its fore-leg.

The pack-saddles used in the interior of Brazil (Minas Geraes, Goyaz, and Matto Grosso) were the most impracticable, torturing arrangements I have ever had to use on my travels. The natives swore by them — it was sufficient for anything to be absurdly unpractical for them to do so. It only led, as it did with me at first, to continuous unpleasantness, wearying discussions,

TORTURING ARRANGEMENTS

and eventual failure, if one tried to diverge from the local habits, or attempted to eradicate deeply-rooted ideas.

Let me describe a typical Brazilian pack-saddle. It weighed, with its inseparable protecting hide, well over 90 pounds. It was bulky and cumbersome, most difficult to lift and set right on the animal's back. It consisted of two great parallel, clumsily carved, heavy, U-shaped pieces of wood, supported upright on two enormous pads, at least double the size and thickness necessary. The breast and tail pieces were of extra thick leather of great width, which had the double disadvantage of being heavy and of producing bad sores by their constant friction and hard, saw-like, cutting edges. Then the saddle allowed the loads to hang much too low on the sides of the animal's body. This naturally saved trouble and effort to the men who packed the animals. Two of them simply lifted the loads simultaneously on the two sides and hooked them to the saddle, by means of adjusted loops of leather or rope. Then came the difficulty of keeping the loads in position, so that they would not shift back and forth. This was done by passing a leather thong over all and under the animal's belly, which was then squeezed beyond all measure. Result of this: continuous trouble to pack rebellious animals, who knew what was coming; painful marching for the animals, who thus had difficulty in breathing, and therefore extra long marches, almost an impossibility without much injury to them. We will not speak of sore backs, sore sides, sore chests, and sore tail root — which was a matter of course after a pack animal had borne for a few hours one of those torturing arrangements on its back.

I had tried to adopt lighter saddles of a more practical design, such as I had used on other expeditions; but as this involved a different method altogether of packing the animals, it led to much derision, unpleasantness, and re-

ACROSS UNKNOWN SOUTH AMERICA

fusal to do the work except in their own stupid way, so that in order to save time, expense, and trouble I had to conform, much against my will, to the Brazilian method. It was an impossibility to induce a Brazilian of the interior to agree that any other way of doing anything was better or even as good as his own.

A painful phase of human existence, as the country became more and more sparsely inhabited, was the number, relative to the population, of cases of sexual insanity, due naturally to the great difficulty of intercourse. We will not refer to sexual vices — extremely common — which reduced the few inhabitants to a state of absolute idiocy. Thus at Laza farm there were only three women and no men. They were all of a certain age, and for many, many years had been there alone, and had not seen a man. They had become absolutely insane, and it required no little tact to prevent a catastrophe. One — a repulsive, toothless, black woman, formerly a slave — was in such an excited state of mind that I was really glad when I saw my troop of animals started on the march early the next morning.

On April sixth we were still on the north side of the Serra de Caldas, at the northernmost point of which flowed a *ribeirão*, or great river (elevation 2,450 feet). Most beautiful grazing land spread to the north of us, enormous stretches of undulating country, verdant with delicious grass. The Sappé Mountains were still visible in the distance.

Marching through enchanting country, almost level, or merely rising or descending a few feet, with a magnificent view of distant mountains to our right and of low, flat plains and far-away tablelands to our left, we arrived, after a morning's march of 36 kilometres, at the fazenda of Pouso Alto (elevation 2,600 feet).

Outwardly Pouso Alto was by far the neatest-looking fazenda we had seen since leaving Araguay, but within

FORMER PROSPERITY

the house the floor was a mass of dirt. Fowls were running to and fro all over the rooms. They contained a rough table of Portuguese origin, a couple of benches so dirty that one did not dare to sit on them, some roughly made bedsteads, miserable and filthy; but no washstands or basins, no articles of necessity were anywhere to be observed or found. The mattresses, if one can elevate them to the dignity of such a name, since they were mere bags, filled with anything that had been found handy, such as the leaves and stalks of Indian-corn, wool and dried grass, were rolled up in the daytime. Only one bed was still made up. On it a cackling hen was busy laying an egg. That egg, a very good egg, was triumphantly served to me for breakfast.

The walls of nearly all the farmhouses in the southern part of the Province of Goyaz were made of wooden lattice work, the square cavities formed by the cross sticks being filled in, and the whole plastered over with mud, which eventually became hard when dry. Near the foundations the walls were strengthened with mud bricks, half baked.

Evidently, as was the case with this particular old house, in former days, in the time of the Emperor, when Goyaz was more prosperous than it is now, most of the houses were whitewashed — a luxury in which, in these days of misery, the farmers can no longer indulge. The doors and windows were rambling, though the frames of them were generally solidly made, but one never saw a pane of glass in any window anywhere in the country. At night the people barricaded themselves securely in their rooms and let no air in. This was partly due to fear of attack. Whenever a building was whitewashed, one invariably saw on it the impression of its owner's spread hand in outline, or else his signature in blue paint. The favourite colours in house decoration, where any were noticeable, were blue and a dirty cinnabar red.

ACROSS UNKNOWN SOUTH AMERICA

Dogs were numerous everywhere, and, like their masters, were indolent and sleepy.

In the afternoon of that same day we travelled some 13 kilometres more, on practically level ground intersected by a couple of streamlets. Marching through thinly wooded country, grassy here and there, one began to notice a variation in the scenery, which was gradually becoming more tropical in appearance. Palm trees, especially burity (*Mauritia vinifera* M.), in single specimens or in groups, could be seen in the great stretches of good grazing country which appeared on both sides of our course.

We spent the night at the fazenda of Ritiro Alegre (elevation 2,450 feet), which words translated mean "the merry rest" — a most undeserved name, I can assure you, for neither merriment nor rest was to be obtained there. An evening in a Brazilian farm was, nevertheless, not devoid of interest or of comic scenes.

These people evidently valued little the life of their children. As I was sitting on the doorstep, waiting for my dinner to be cooked, a little child of eight came galloping down at a breakneck speed and riding bareback, a smaller child of one slung under his arm and squealing terribly. They both landed safely at the door. Then there appeared one of the picturesque carts drawn by twelve oxen, anxiously awaited by the family. Twenty snarling, snorting ill-natured pigs provided enough noise to impair seriously the drums of one's ears; and when you added to this the monotonous bellowing of cows and oxen, the frantic neighing of horses and mules waiting to be fed, the crowing of cocks and the cackling of hens, the unmusical shrieks of a beautiful *arara* (or macaw, of gorgeous green, blue, and yellow plumage), and of two green parrots — to which total add, please, the piercing yells of the children — it was really enough to drive one insane.

They were superior farmers, those of the "Merry

A NIGHT IN A FARMHOUSE

Rest ”; no one could doubt it when the lady of the house and her pretty daughter arrived from an errand and found strangers in the house. Dear me, what style, what enchanting affectation the pretty maid and her mamma put on when they perceived us! With an air of solemnity that was really delightful, they each offered the tip of one finger for us to shake, and spoke with such affectation that their words stumbled one against the other. Their vocabulary was evidently restricted, and in order to make the conversation elegant, they interpolated high-sounding words which did not exactly belong, but sounded grand in their ears. It was a trial to remain serious.

Dinner was served — always the same fare wherever you went. Boiled rice (very badly boiled), beans, stewed chicken chopped up, *pimienta* (peppers), fried eggs, and Indian corn flour, which one mixed up together on one’s plate and rendered into a paste. The coffee was always plentiful and good, but so strong that it was quite bitter.

By the light of a wick which burned and smoked terribly from the neck of an ex-medicine bottle filled with oil, we enjoyed our meal, watched intently by the entire family, silent and flattened in semi-obscurity against the walls. The primitive lamp gave so little light, although it gave abundant smell, that the many figures were almost indistinguishable against the dirty background, and all one perceived on raising one’s eyes from the dinner-plate was a row of expanded eyes, following the movements of our hands, and just under that row a line of white teeth.

When in a stronger light, it was curious to notice criminal characteristics on nearly every face one saw; in the servants at those farmhouses one frequently observed murderous-looking creatures whom one would not care to meet alone in the dark. They were a special breed of stranded outcasts who had drifted there; the outcome of a complex mixture of Portuguese, former black slaves, and Indians. When you realized that the people who had

ACROSS UNKNOWN SOUTH AMERICA

drifted into the interior were the worst Portuguese, the worst blacks, and the Indians who intermarried with these gentry the worst Indians, you can well imagine what fine results could be expected from such a breed.

One trait predominant among these people was the unreasonable jealousy of the men over their women. Had they been so many Venuses of Milo the men could not have guarded them with more ferocity. I am sure it would take a brave man indeed, and, above all, a totally blind man, to fall in love with the farmers' wives, daughters, or servants of the Province of Goyaz.

I must say this in favour of my Brazilian men, that, whatever other faults they may have had, they always behaved in a most chivalrous, dignified way with the women-folk we met. Never once did I have to reprimand them.

In the morning, as the cows were driven into the yard to be milked, and the calves were being suckled by their mothers, and the children, rubbing their sleepy eyes with the backs of their hands, scrambled out of the house upon their drowsy legs, the girls of the family brought the last cups of coffee to us departing strangers. We packed our animals, paid the bill, and were off again.

On April seventh we crossed the Piracanjuga River, another tributary of the Corumbá, 50 yards wide, flowing from northeast to southwest, at an elevation of 2,300 feet. One league (6 kilometres, 600 millimetres) farther on we crossed another stream flowing east, in its turn a tributary of the Piracanjuga.

One of the most beautiful trees in that region was the *caneleira*, of the family of the *Laurineas*. Beautiful, too, were the *oleo pardo* and *vermelho* (*Myrocarpus frondosus* and *Myrospermum erythrozyton*).

We were next treated to a view of an extensive, deliciously green valley, most excellent for grazing purposes, extending from north to south to the west of

A BEAUTIFUL VALLEY

our route. In the central depression of this valley were burity palms in abundance. They say that wherever you find a burity, you are sure to find water. It is perfectly true, as the burity flourishes only where there is a good deal of moisture in the soil.

Having crossed a low pass, we found ourselves in another valley — this one sparsely wooded (2,500 feet above the sea level), very beautiful, with undulations some 200 feet high, and with streamlets at the bottom of most of the undulations. The summit of the highest elevation on that undulating land was 2,750 feet, the level of the principal streamlet 2,600 feet above the sea.

CHAPTER VI

INQUISITIVENESS — SNAKES — A WONDERFUL CURE — BUTTERFLIES —
A STRIKING SCENE

TWENTY-NINE kilometres from the “Merry Rest” we arrived at the little town of Pouso Alto — duly translated “high camp” — situated 2,750 feet above the sea level on an elevation between the two rivers Piracanjuba and the Furniga, which afterwards became the Rio Meio Ponte, throwing itself into the Paranahyba River.

Pouso Alto was like all the other *villas* or settlements of Goyaz, only perhaps a little larger. The same white-washed houses with doors and windows decorated with blue, the same abandoned, deserted look of the principal square and streets; in fact, another “city of the dead.” Only two men drinking in the local store were visible in the whole village.

The usual impertinent questions had to be answered.

“Who are you? Why do you come here? Is your country as beautiful as ours? Have you any cities as large as ours in your country? How much money have you? Are you married? You are English; then you come here to steal our gold and diamonds.”

“Have you any gold and diamonds here?”

“No!”

“No, you cannot travel for pleasure. The English travel only to take away all the riches from other countries! Those instruments you carry” (a compass and two aneroids) “are those that tell you where to dig for gold!”

FUNEREAŁ TOWNS

I could not help remarking to this gentleman that so far the country I had traversed seemed merely to be rich in misery, that was all.

Nothing more funereal than those little towns could be imagined. My men intended remaining there for the night, but I insisted on pushing on for a few more kilometres, especially as in these places my men were led to drink and became unmanageable. On we went for nine kilometres to the farm of Bellianti (elevation 2,500 feet above the sea level).

On April eighth we made an early start and travelled through a luxuriant forest, which was daily getting more and more tropical as we went farther north. Do not forget we were, of course, south of the equator.

Thirteen kilometres from camp we crossed the Rio Furmiga (or Meio Ponte) about 100 yards wide, flowing there in a direction from east to west at an elevation of 2,000 feet. Most gorgeous, richly verdant vegetation overhung and festooned the banks of the stream.

As we went farther toward the interior, the vegetation grew more beautiful, the people more repulsive. The majority of the people suffered from goître in more or less advanced stages. Many were affected by leprosy.

We were in a region where oranges (imported, of course) of most excellent, juicy quality were obtainable; for instance, at the farm of Felicidade (elevation 2,350 feet). All those farms — very old — showed signs of having seen better days; no doubt when slavery existed in a legal form in Brazil and it was possible to work those estates profitably. With the prohibitive price of labour, and in fact the impossibility of obtaining labour at any price in the interior, farming cannot indeed flourish to-day. The comparatively few immigrants who landed at the various ports in Brazil were at once absorbed near the coast, and seldom left the port of landing, where labour was anxiously required.

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For the first time, that day did I see two snakes, which were concealed in the deep grooves left by a cart wheel. One wound itself around the front leg of my mule, and for a moment I was anxious lest the animal had been bitten; but fortunately the snake, which had been trodden upon, did no damage. Only rarely did we see a bird anywhere, except in villages, where an occasional crow, with its dried-up neck and jerky motions, could be seen. How like the inhabitants those birds were!

Twenty-seven kilometres farther, we reached Santo Antonio, a village situated in quite a heavenly spot, 2,800 feet above the sea level, but in itself one of the most miserable villages I have ever seen. There were altogether some forty houses scattered about, eight of which were along the sides of the principal square — an abandoned field. The church had the appearance of a disused barn. A large wooden cross stood in front of it, upon which birds had built their nests. Four thin, anæmic-looking palms stood at different angles by the side of the cross. We had the misfortune to stay there for the night. By seven o'clock everybody had barricaded their houses and had retired to sleep. There was, of course, no such thing as a post-office or a telegraph in the place. The nearest place where a letter could be posted was some 72 kilometres away, on the high road between Goyaz and Catalão. Goats tied in pairs, with a log of wood between in order to keep them apart, seemed to have the run of the place, and were the only things there which appeared to have any life in them.

But if the place was miserable, if the natives were repulsive and dull, there was plenty to be thankful for in admiration of the really glorious country around, and the superb sunsets to which we were treated every evening. Again that evening, when everybody in the place was slumbering, the sunset was more wonderful than words can describe. The usual radiations, which again reached

GLORIOUS LANDSCAPE

the highest point of the sky's vault, were that night white on the west, with corresponding ones of brilliant cobalt blue to the east.

A drizzling rain rendered the night cold and damp, although the Fahrenheit thermometer registered a minimum temperature of 70°.

On leaving Santo Antonio, the trail ascended to a height of 3,100 feet ($4\frac{1}{2}$ kilometres from the village), and we were then in a rich forest region, where the *acaju* — of the *Terebinthaceæ* family — was plentiful, with its huge leaves and contorted branches. The *acaju* produced a refreshing fruit, either of a bright red or else of a yellow colour, not unlike a large pepper, outside of which was strongly attached a seed possessing highly caustic qualities. Many *gordinha* trees were also to be seen. It was interesting to see how those zones of forest were suddenly succeeded by beautiful and vast areas of grazing land, such as we found that day. We crossed three streams at the respective elevations of 2,550 feet, 2,650 feet, and 2,750 feet, after which we reached an elevation of 3,000 feet, the highest we had so far attained on our route from the coast, where we found ourselves on a grassy tableland of considerable beauty. Looking back to the south-southeast, we perceived the two hill ranges, one behind the other, which we had crossed. Between them and us were marvellous slopes covered with green grass, but not in the lower portion, where bordering the stream was luxuriant forest. This was noticeable also on a hill to the west, forming a minor tableland with rounded sides.

To the north-northeast was a perfectly flat plateau. The distance rendered it of a deep blue, and its level sky-line gave the appearance of the horizon upon the ocean, except that two small peaks stood up slightly above the elevation of the plateau. On all that beautiful land only two small miserable farms were to be seen. Yet it

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seemed to be a paradise on earth: delightful climate, excellent soil, useful woods in the forest, plenty of delicious water.

Three more streamlets flowing from west to east were encountered at elevations of 2,700 feet, 2,750 feet, and 2,800 feet, with undulating grassy land between of wonderful beauty.

Having deviated somewhat from our route, we at last descended into a grassy valley, absolutely flat, the best of all we had seen. It had been fenced all round. Upon inquiry, I learned that it had been acquired by the Redemptionist Friars. There is one thing friars certainly know. It is how to select the best land anywhere to settle upon.

We had travelled 46 kilometres, 200 millimetres that day, when we arrived at Campinas (elevation 2,550 feet above the sea level), the usual kind of filthy village with tiny, one-storied houses, more like toys than real liveable habitations. This time the doors and windows were bordered with grey instead of blue. On nearing those villages in Central Brazil, one frequently found an abundance of rough wooden crosses scattered upon the landscape. They marked the spots where individuals had been killed.

In the room where I put up in the village, in the *hospedagen*, or rest-house, the floor was besmeared with blood, the result of a recent murder. The shops grew more and more uninteresting as we got farther into the interior. The difficulties of transport were naturally greater, the prices rose by leaps and bounds, as we got farther; the population got poorer and poorer, for lack of enterprise. The articles of luxury and vanity, so frequently seen in shops before, were now altogether absent, and only bottles of inferior liquor and beer, matches, and candles were sold; that was all. No trade, no industry, no money, existed in those places. If one happened to



BRAZILIAN PACK-SADDLES.



A TYPICAL VILLAGE.
The higher building is the church.



AUTHOR'S CARAVAN ABOUT TO CROSS THE CORUMBA.



BURITY PALMS.

A WOUNDED MULE

pay with a five or a ten-milreis note (6s. 8d. or 13s. 4d.), one could never obtain change. Frequently, unless you wished to leave the change behind, you were obliged to carry away the balance in cheap stearine or beer. I took the stearine. A short distance from the town was a seminary, with four German friars, very fat, very jolly, very industrious.

Alcides, one of my men, was by way of being a veterinary surgeon. Here is how he cured a wounded mule, which, having received a powerful kick from another animal, displayed a gash three inches long in her back, and so deep that the entire hand could be inserted and actually disappear into the wound. Francisco, another of my men, having duly and firmly tied the animal's legs — a sensible precaution — proceeded with his naked arm to search for *bishus*: anything living is a *bishu* in Brazil, from an elephant to a flea; but in this particular case it was applied to insects, such as *carrapatos*, maggots, or parasites, which might have entered the wound. Having done this at considerable length and care, he proceeded to tear off with his nails the sore edges of the laceration, after which he inserted into the gash a pad of cotton-wool soaked in creoline. That was the treatment for the first day. The second day, the wound proceeding satisfactorily, he inserted into it, together with his hand, a whole lemon in which he had made a cut, and squeezed its juice within the raw flesh. The amazing part of it all was that the animal, with an additional bath or two of salt and water, recovered absolutely from the wound and got perfectly well.

The Redemptionist monks had a fine vineyard adjoining their monastery — the only one of any size and importance we had seen since leaving the railway — and also some lovely orange groves in a walled enclosure. They had built a mill on the bank of the stream. Most of that beautiful valley for miles and miles belonged to

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them. The town of Campinas, not to be confounded with Campinas of São Paulo Province, had a population of 600 souls.

When we left that place the next morning, again we went across beautiful flat stretches of grassy land several miles long and broad, regular tablelands, at an elevation of 2,700 feet: most wonderful pasture lands now going absolutely to waste. Plentiful streamlets intersected those lovely meadows at a slightly lower elevation of merely a few feet, where the water had eroded itself a channel. Those streams were generally bordered by a thick growth of trees and entangled vegetation. We stopped for lunch at the farm of *Boa Vista* (Belvedere or Fine View), so called, according to the usual Brazilian way of reasoning, because it was situated in a deep hollow from which you could see nothing at all! Another more rational name which this place also possessed was *Bocca do Matto* (Mouth of the Forest), because it truly was at the entrance of a thick forest extending to the north.

We went, in fact, from that point through densely wooded country, although the trees were of no great height or size. The ground was swampy and sloppy, most unpleasant for marching, for some 19 kilometres, until we arrived at Goyabeira (elevation 2,700 feet), having covered 56 kilometres, 100 millimetres that day — not at all bad marching, considering that we could not change animals and that we conveyed all our baggage along with us.

I saw that day another snake, called by the natives *duas cabecas* (and Tu Nou), or double-headed snake, because its marking gives that impression at first sight.

After leaving Goyabeira, the thick growth continued over several ridges, the highest of which was 2,950 feet, with streams between at elevations respectively of 2,630 and 2,700 feet. I noticed in the forest some beautiful *paneira* trees, with their trunks enlarged near the base —

AFFECTIONATE BUTTERFLIES

a regular swelling all round. One of the peculiarities of this tree is that it produces a kind of vegetable wool contained within fairly hard capsules.

That was indeed a day of surprises for us. As we were proceeding over another hill range between two streams (elevation 2,850 feet), we saw at last some butterflies of a gorgeous lemon yellow, some of a rich orange, others of red and black, great numbers of pure white, and some huge ones of an indescribably beautiful, metallic blue colour. There were swarms of them near the water. So unaccustomed were they to see human beings that many settled on my white coat and on my straw hat and were carried along undisturbed for long distances upon my person. They were so beautiful that I had not the desire to kill them, even for the sake of bringing back a valuable collection. It would have been easy to capture them, as you could touch them several times with your fingers before they would fly away. One butterfly particularly took a great fancy to my left hand, in which I held the reins of my mule, and on which it sat during our marches for several days — much to my inconvenience, for I was afraid of injuring it. It would occasionally fly away and then return. At night, while we were camping, I transferred it to my straw hat, on which it quietly remained until the next morning. The moment I had mounted my mule, the butterfly would at once fly again to my hand. This great affection was due chiefly, I believe, not to any magnetic attraction, but merely to the delicately scented soap which I used in my morning bath, and which greatly attracted the butterfly.

On many occasions on that expedition I had similar experiences with butterflies.

For the first time, too, I perceived that day a few *colibris* — tiny humming birds of wonderful plumage.

Twenty-three kilometres from Goyabeira, after many ups and downs along a deep-channelled, slushy trail, and

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after crossing over several swampy, troublesome stream-lets, we suddenly emerged into a marvellous, undulating, grassy plain with numerous fat cattle grazing upon it. In the distance, upon the hillside, four or five farm-sheds could be perceived. We had stopped at one farm on the way in hopes of getting food, but they could sell us only some *feijao* — beans soaked in lard — so that it was with some haste that we directed our mules to the more imposing building, in expectation of finding there at least some rice and eggs. We hurriedly crossed the plain and then the stream, and halted at the Cachoeira Grande (Grand Rapid) farm, 2,950 feet above the sea level. A pure negro was in charge of the place, whose wife was also as black as the ace of spades. Curiously enough, they possessed a child much lighter coloured and with golden hair and blue eyes. Such things will happen in the best regulated countries. The black man swore it was his own child, and we took — or, rather, did not take — his word for it.

We went on 13 more kilometres that afternoon, when we were overtaken by a hurricane and torrential rain which drenched us to the marrow of our bones. We halted for the night at the farm of *Lagoa formosa* (Beautiful Lagoon), 3,000 feet above the sea level.

On April twelfth we proceeded to climb the dividing range between the waters flowing south into the Parana-hyba (afterward called the Parana) River, and those flowing north eventually into the Amazon. This range of mountains was by some called Serra de Sta. Rita, by others Serra Dourada. It was not possible to ascertain the real name from the local people, who could tell me the names of no place, or mountain, or stream, and hardly knew the names of their own homes.

On a flat expanse some 13 kilometres from Lagoa Formosa we came upon a small lake. We travelled mostly across campos (or prairies), with waters from

A MOUNTAINOUS REGION

that point flowing northward. Seventeen kilometres farther we entered the neat-looking village of Curralhino (elevation 2,600 feet), with two squares and streets actually with names to them. We were from this point on the main route between São Paulo and the capital of Goyaz, and also met there the telegraph line between Goyaz and São Paulo.

We were getting near the capital of the province. A little more life was noticeable in this settlement than in those we had met before. Caravans of mules and horses occasionally passed through, and bullock-carts, with eighteen and twenty oxen, slowly and squeakily crept along. We were going through a region that was more than hilly, almost mountainous, the first of the kind we had encountered since leaving the railway.

At Camp Maria Alves we were at an elevation of 3,000 feet. Beautiful crystals were to be found at and near this place. Many were enclosed in hard envelopes of yellow lava, which contained besides semi-crystallized matter easily crushed; to be strictly accurate, the imprisoned infinitesimal crystals were easily separated, under gentle pressure. Some spherical balls and pellets of lava I picked up, when split, contained red, baked earth, which had evidently been subjected to intense heat. In the centre of these pellets one or more crystals of great clearness were invariably to be found. These pellets must have been expelled with terrific force from a volcanic vent, and must have travelled great distances, for the depression where I found them had a surface of alluvial formation.

On April thirteenth we again rose over a range where we encountered a good deal of igneous rock and quantities of beautiful crystals. We had a range to the west of us and one higher and more important to the northeast, the latter more broken up than any we had so far seen in the three last provinces crossed. We somehow missed now the lovely pasture lands of the day before, so refreshing

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to the eye, and the landscape had suddenly become more rugged and barren, except near water. Some nine kilometres from the farm Maria Alves the Uru or Oruba River (elevation 2,550 feet) flowed north; there it is merely a picturesque torrent among rocks and overhanging vegetation on both banks.

The wonderful effect of erosion was noticeable on the mountain sides to the north of us, where it had left a top terrace with deep corrugations in the lower sides of the mountain. A miserable-looking farmhouse could be seen here and there — quite as miserable as the country in itself was rich. Some shaggy policemen, in rags and barefooted, passed us, guarding an ox-cart conveying treasure to the capital. Only the oxen and some cows which were about looked at us with interest, and sniffed us — it is wonderful how quick animals are at detecting the presence of strangers — but the people took no notice of us. Here and there a tumbled-down tree blocked the way. There were tracts of pasture land. My men were considerably excited on seeing a poisonous snake crawl swiftly towards our mules. It was perhaps an absent-minded or a short-sighted snake, for no sooner did it realize our presence than it quickly veered round to escape. My men killed it.

At an elevation of 2,500 feet we met a limpid stream of most delicious water. At that particular spot it flowed south.

We were now confronted with a range of actual mountains. The trail took us over wonderful, rugged scenery, masses of pillar-like, grey rock of granitic formation. On the summit of the pass we passed over strata of half-solidified tufa in sheets — or foliated — easily crumbled and finely powdered between one's fingers. The strata were at an angle of 45° , showing that they had undergone some disturbance. They had been subjected to great heat, for in some places they had been

A GREAT SUBSIDENCE

hard baked, which rendered them of a yellowish brown colour. On the left of us, to the west, a great vertical pillar of rock plainly showed the stratification, the continuation of which could be followed on the opposite side of the pass, both in the horizontal strata and those which had been forced up at an angle. Looking back from the pass, we obtained a heavenly panorama of wooded hills to the southeast, far, far beyond in the background, and of glorious campos between them and us. With the winter coming on — of course you know that south of the equator they have their winter when we have our summer — beautiful yellowish, reddish, and brown tints of the foliage added picturesqueness to the landscape.

The pass itself was 2,850 feet above the sea level. There was not much in the way of vegetation, barring a few stunted *sucupira* trees. The air was exquisitely pure, and the water of two streamlets at 2,550 feet altitude delicious and cool. We were marching over quantities of marble fragments and beautiful crystals, which shone like diamonds in the sun. Having gone over the pass, we came upon a most extraordinary geological surprise. There seemed to have been, in ages long gone by, a great subsidence of the region north of us. We were then on the steep edge of what remained of the plateau, and down, down in the depth below, was an immense valley in which Goyaz City lay.

To the west of us — as I stood impressed by that awe-striking scene — we had the irregularly cut continuation of the edge of the plateau on which we stood, supported as it were on a pillar-like granitic wall of immense height and quite vertical, resting on a gently sloping base down to the bottom of the vast basin below.

This great natural wall of gneiss, which contained myriads of crystals and mica schists, shone like silver in the spots where the sun struck it, and with the lovely pure cobalt blue of the distant hills, the deep green of the

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valley below, and the rich brown and yellow and red tints of the near foreground, made one of the most exquisitely beautiful sights I have ever witnessed. The nearest approach to it in my experience was, perhaps, the eastern escarpment of the Abyssinian plateau in Africa, where a similar panorama on a much smaller scale could be seen, but not the same geological formation.

No sooner had I recovered from the strangeness and marvellous beauty of Nature's work around me, than I felt a great shock at seeing what men had done in that region. We were at this point on the high road between São Paulo, Uberaba, and Goyaz, the capital. As my animals stumbled down the steep escarpment, traces could be seen of what must have been formerly a beautiful, paved road, well-drained on both sides with channels, and held up in terraces by stone works where the gradient was steepest. Here and there bits still remained, demonstrating how well the road had been made. But, uncared for and abandoned, most of it had been washed away by the heavy rains, which had turned that road into a foaming torrent in wet weather. Near habitations, the well-cut slabs with which the road was paved had proved convenient to the natives for building purposes. During the time of the Emperor Pedro II., that was a magnificent road, I was told, kept in excellent repair.

Goyaz City lay before us, down, down below, in the hollow of the huge depression. Its single row of low, whitewashed houses of humble architectural pretensions, became less and less impressive and less picturesque as one got nearer. I had by that time grown quite accustomed to this optical disillusion, for it was frequently the case with the work of man in Brazil. It always needed distance—the greater distance the better—to lend enchantment to it.

With a feeling of intense oppression, perhaps due to the stifling air and the lower elevation (1,950 feet) at

GOYAZ CITY

which Goyaz City lay, we entered the capital of Goyaz. At the sound of our mules upon the pavement, timid men, timid women, and children cautiously peeped from each window through the half-closed Venetian blinds. We had only to turn round to peep at them, and with terrified squeals the hidden creatures banged and bolted the windows. The sight of a stranger in Goyaz was apparently an event. Whether we were expected or not, I do not know, but the whole population seemed to be hiding behind the tiny windows to look at us. The few who were caught in the street seemed as if they wanted to bow but had not the courage to do it. Indeed, their timidity was intensely amusing. Some, more courageous, gave a ghastly grin, displaying rows of irregular teeth in a terrible condition of decay.

DISTANCES BETWEEN ARAGUARY AND GOYAZ

Araguary to Paranyhyba	59	kil.	400	m.	= 9 leagues.
Paranyhyba to Corumbahyba	59	"	400	"	9 "
Corumbahyba to Caldas	59	"	400	"	9 "
Caldas to Pouso Alto	79	"	200	"	12 "
Pouso Alto to S. Antonio	59	"	400	"	9 "
S. Antonio to Campinas	46	"	200	"	7 "
Campinas to Goyabeira	56	"	100	"	8½ "
Goyabeira to Curralhino	66	"	.	"	10 "
Curralhino to Goyaz	46	"	200	"	7 "
Total	531	"	300	"	80½ leagues

CHAPTER VII

IN THE CITY OF GOYAZ

THERE was no such thing as an hotel in the Goyaz capital. The nearest approach to it was a filthy rest-house for muleteers, which was, furthermore, already full. Against my usual custom — as I never, unless absolutely necessary, make use of the credentials I carry for my private needs — I had, therefore, to apply to the Presidente or Governor of the province to find some sort of accommodation in the town for my animals, men, and myself.

“Take off your spurs before you enter!” roughly shouted a sentry at the Governor’s palace, a huge barn-like structure, just as I was stooping to do that before being asked.

“Do not stand on the pavement,” said the sentry again, anxious to display his authority.

Being a law-abiding person, I shifted to one side.

“Do not stop under the Presidente’s window!” cried the policeman angrily once more, digging me in the ribs with his bayonet.

I was beginning to be sorry I had not brought an aeroplane with me in order to complete my toilet in the air before entering so sacred a precinct, but patience being one of my chief virtues, I transferred myself to the remotest point across the square, where, stork-like, upon one foot at a time I was able — this time undisturbed — to remove both spurs.

“Take off your hat before entering,” again shouted

ETIQUETTE

the policeman, as I was still some fifteen yards from the door.

I really began to feel rather nervous, with all those orders grunted at me. I wondered at the strange people who must visit the palace to have to be instructed to such an extent before entering. I also stopped for a moment to ponder whether I had taken off all that was necessary to enter a palace where so much etiquette was required.

The moment I entered things were different. I was ushered into an ante-room, where I had to go through a short cross-examination by some police officers. Then, when they had made sure of my identity, they immediately led me before the Presidente.

The Presidente greeted me with effusion. He was a most polished and charming gentleman from Rio de Janeiro, had travelled extensively in Europe, and could speak French and English. He roared heartily when I told him of my experience outside his palace.

"They are all savages here," he told me; "you must not mind. The sentry has orders to keep everybody away from the palace, as people come in the afternoon and squat under my windows to jabber, and I cannot sleep. Those orders, I assure you, were not meant for you. You will be my guest all the time you are in the city, and I can accept no excuse."

The Presidente placed a small house near the palace at my disposal, and insisted on my having all meals with his family — a most refined, handsome, exquisitely polite wife and daughters.

I presented the credentials I possessed from the Minister of Agriculture in Rio and the Brazilian Ambassador in London, requesting the Presidente to do all in his power to further the success of the expedition — I, of course, paying all expenses. The Presidente, like most other Brazilians of a certain age, was *blasé* beyond words.

ACROSS UNKNOWN SOUTH AMERICA

Nothing interested him except his family, and life was not worth living. He believed in nothing. He was an atheist because he had not been as successful as he wished in the world, and attributed the fault to God. He cared little about the future of his country. If his country and all his countrymen went to a warmer place than heaven, he would be glad to see them go that way! As for going exploring, mapping unknown regions, studying the country and the people, building roads, railways, and telegraphs, it little mattered to him, but it seemed all nonsense.

"Instead of coming to these wild, deadly regions, why do you not go and spend your money enjoying yourself in Paris or Vienna?" was his advice to me.

"Perhaps I need a change occasionally, and I enjoy things all the more by contrast when I return to Europe."

The Presidente was evidently not in good health and spirits. He was a Senator of the Republic, and a man formerly of great ambitions, which were more or less shattered when he was elected Governor of Goyaz Province, with its population of corpses, and at a salary of £40 a month — very little more than I paid my head muleteer — so that little could be expected from the Governor of such a province.

It was thus that the State of Goyaz, one of the naturally richest in Brazil, containing pasture lands unique for their beauty, forests with valuable woods, plenty of water and great navigable rivers draining it both north and south, of which it was sufficient to mention the magnificent Araguaya River, the Rio Tocantins and the Paranyhyba (or Parana), was instead one of the poorest. In the very heart of Brazil, Goyaz was geographically and politically the centre of the Republic. With an area of 747,311 square kilometres (288,532 square miles), the province had an estimated population



THE PRESIDENT OF GOYAZ AND HIS FAMILY.
Giant cactus in background.



THE MAIN SQUARE OF GOYAZ CITY.
Showing prison and public library.



SOME OF THE BAGGAGE AND SCIENTIFIC INSTRUMENTS
USED BY AUTHOR ON HIS EXPEDITION.

GOLD MINES

of some 280,000 souls, or less than one to every square mile.

The region forming the present State of Goyaz was first explored in 1647 by Manoel Correa, a native of São Paulo, and in 1682 by another Paulista, Bartholomeu Beuno de Silva, who both were prospecting for gold. The latter was successful in locating gold mines and in making friends with the local Indians of the Goyaz tribe, from whom the province then took its name. Some forty-three years later, de Silva returned to São Paulo with 918 ounces of gold. The news of these goldfields quickly attracted a great number of adventurers to Goyaz. The country then saw its most prosperous days, especially in and near Villa Boa, the present city of Goyaz, where gold was said to have been plentiful in those days.

The enterprising Bartholomeu Bueno de Silva returned to Goyaz in 1731 as a Capitão Mor, or Grand Captain, with the right to dispose of land. In 1822 Goyaz was recognized as a province of the Empire, and subsequently in 1869 it became one of the States of the Union, with autonomy as regards local affairs under its own Constitution, approved by the Federal Constituent Assembly in 1891.

Cattle, horse, and mule breeding on a small scale was the chief source of income of that magnificent State — an income which in less indolent hands might be increased ten-thousand-fold or more. Its horses and mules found a ready market in the adjacent State of Matto Grosso and from there went into Bolivia, while the States of Minas Geraes and São Paulo were the chief buyers of pigs, *toucinho* (dried pork fat), dried beef, hides raw and cured, cheese, lard, etc.

Goyaz prided itself greatly on its horses, which enjoyed a certain fame all over Brazil. Perhaps they were in a way as good as any produced in the Republic. With a little study and care in the breeding, they might

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be greatly improved and rendered as sturdy and good-looking as some horses of Asia and Northern Africa. So far they were far inferior in appearance and endurance to the horses of Arabia, Turkestan, Europe, and Abyssinia.

The most interesting type of the Goyaz horse was what is called the *curraleiro* or "stable horse," bred in the north of the State, especially in the valley of Paranan, bordering upon Minas and Bahia. The *curraleiro* was also known as *cavallo sertanejo* or "horse of the jungle"—two most inappropriate names, for it was, accurately speaking, neither the one nor the other.

The Goyaz horse was a typical Brazilian horse. It shared many of the characteristics of the people of the province. Timidity, laziness, lack of affection and judgment, sulkiness and great stubbornness under training of any kind were its qualities. This was due chiefly, I think, to its inferior intelligence when compared with thoroughbred horses of other nations. The Goyaz horse was small, fairly agile, and when well cared for, had a handsome, shiny coat with luxuriant mane and tail. It was capable of short, noteworthy efforts, but did not possess abnormal endurance.

The present *curraleiro* is a mere degeneration of what must have formerly been an excellent horse. Considering the absolute lack of care taken in its breeding, it was certainly remarkable that it has proved to be as good a horse as it actually is. Judiciously crossed with Hungarian, Turkestan, Arab, or Abyssinian horses, I think that quite excellent results might be obtained. It must be taken into consideration that great hardships and work of the roughest character were demanded of animals in Central Brazil.

A praiseworthy movement was started some years ago by Marechal Hermes da Fonseca, now President of the Republic, to mount the entire Brazilian Cavalry on na-

CATTLE BREEDING

tional horses. That will perhaps lead some day to a great improvement in the breeding of animals all over the country, and especially in Goyaz, which provides the most suitable land for that purpose. The same remarks could, perhaps, in a slightly lesser degree, be applied to the breeding of donkeys and mules. No care whatever was exercised by the breeders in order to improve the breeds. Everything was left to luck and chance. The result was that a degenerate type of animal was produced — wonderful indeed, considering the way it was bred, but which might be improved to an immense extent and made into a remarkable animal, in such a propitious climate and with such marvellous pasture lands.

With cattle, also, it is safe to assert that since the colonial time very little fresh foreign blood of any importance has been introduced in breeding — except, perhaps, some inferior types of the Indian humped zebu. Most of the stock I saw in Southern Goyaz was intermixed with zebu. The formerly existing bovine races, such as the Mocha, Coraçu, and Crioula, have now almost altogether disappeared.

Unlike most other States of Brazil, Goyaz had no Provincial Customs duties. With its immense frontier, bordering upon seven different other States, it would be impossible to enforce the collection of payments. No reliable statistics were obtainable as to the amount of exports or imports of the State. Even approximately it would be impossible to make a guess as to the actual amount of its resources.

Sugar-cane and tobacco could be profitably grown in the State. The small quantity of tobacco grown there was of excellent quality.

The Government of Goyaz Province consisted of three Powers: the Executive, represented by the President, elected for three years by universal suffrage; the Legislature — a Chamber of Deputies equally elected for

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three years by suffrage; and a Judicial power constituted by the High Court of Justice, *Juges de droit* — law judges — and District Judges. To be elected President of Goyaz State all that was necessary was to be a Brazilian citizen, over thirty years of age, and able to read and write. The same applied to the election of Deputies, for whom a residence of only two years in the State was sufficient.

The capital of Goyaz, which is situated on the Rio Vermelho, a tributary of the great Araguaya River — had, according to the census of 1900, a population of some 13,475 people, but I rather doubt whether it possessed as many as eight or ten thousand souls when I visited it. One could notice indications that in days gone by Goyaz had been a flourishing place. There were a number of fine churches, and a large cathedral in course of construction, but since abandoned. Some of the buildings, too — the finest was the prison — must have been quite handsome, but were now in a dilapidated condition. It was really heart-breaking to see such a magnificent country go to rack and ruin: a State naturally the richest, perhaps, in Brazil, yet rendered the poorest, deeply steeped in debt, and with the heavy weight of absurdly contracted loans from which it had no hope whatever of recovering under present conditions. They had in the province the most beautiful land in Brazil, but it was a land of the dead. People, industries, trade, commerce, everything was dead. Formerly, in the time of the Emperor and of that great patriot General Couto de Magalhães, Goyaz City could be reached, within a few kilometres, by steam on the beautiful river, the Araguaya, which formed the western boundary of the province, an ideal waterway navigable for 1,200 kilometres — in Goyaz Province alone. In the time of the Emperor, when Brazil was a wild country, steam navigation actually existed up the Araguaya River from

THE TOCANTINS RIVER

Concepção as far as Leopoldina (the port for Goyaz City). The river was free from obstacles of any kind, even in the dry season. There were then three beautiful English-built launches on that service. A fine repairing shop had been erected at Leopoldina.

But in these days of civilization, order, and progress, the steamers have been purposely run aground and left to rot. There was actually a tree growing through the hull of one of those launches when I last heard of them; the machine shop was robbed of all its tools, and the machinery destroyed and abandoned. The Presidente told me that the Provincial Government had eventually bought the wrecks of the launches and the machine shops for £20; and as it cost too much to leave a man in charge, everything had since been abandoned.

When I visited Goyaz, there was no sign and no hope of re-establishing steam navigation on that marvellous waterway.

The Tocantins River, which intersected the province from Goyaz to its most northern point, was also another serviceable stream; but no one used it, except, perhaps, some rare private canoe taking up goods to settlements on its banks.

The navigation of the Tocantins, when I was in Goyaz, extended merely to the Port of Alcobaça, 350 kilometres from Para, from which point rapids existed which made steam navigation impossible as far as Praia da Rainha. The distance of 180 kilometres between those two places was eventually to be traversed by a railway, a concession for which had been granted to the Estrada de Ferro Norte do Brazil. In the High Tocantins I believe two steam launches were temporarily running as far as Porto Nacional or perhaps a little higher.

Undoubtedly the State of Goyaz will some day, notwithstanding its apathetic inhabitants, see great changes for the better. The new epoch will begin when

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the several railways which were in course of construction from various directions, enter the province. Not one of them had penetrated the province at the time of my visit, although the work of preparing the road had just been begun on Goyaz territory, as we have seen, for a few kilometres north of the Parana River, on the extension of the Mogiana line from São Paulo. A second railway line in course of construction was a branch of the Western Minas Railway; and there was a third up the Araguaya from Para. Those railways will certainly revolutionize the country. The inhabitants of Goyaz, ultra-conservative in their ideas, were not at all anxious to see a railway reach their capital. In their curious way of reasoning, they seemed to think that the railway would make life dearer in the city, that strangers would be coming in great numbers to reap the benefit of their country, and that the younger people who were satisfied to live there — because they could not get away — would all fly to the coast as soon as the railway was established, to enjoy the luxuries of Rio and São Paulo, of which they had heard, but could so far only dream of. They did not stop to think that the railways will certainly make Goyaz the richest country in the world.

The financial condition of that beautiful State can perhaps best be shown by quoting the words of the Presidente himself, in his message to the Legislative Congress of Goyaz on May 13, 1910, on assuming the Presidency of the Province.

“On my assuming the Government of the Province, I ordered the Secretary of Finance to give an account of the balance existing in the State Treasury; and it was verified that up to April 30th last there existed a sum of Rs. 87,000,000 (£5,800 sterling), which became reduced to Rs. 50,000,000 (£3,334 sterling) after the payments made on the 1st, 3rd, and 4th of the present month (May, 1910). It must be understood that the

FINANCIAL CONDITION

above-mentioned sum does not represent a balance existing in the Treasury, because it includes deposits and guarantees, as well as the deposits of the Orphan Asylum and of the Monte Pio.

“Leaving out the sums left in the Treasury on deposit, and which represent in fact a debt of the State, we come to the conclusion that there is no money whatever in the Treasury, and that the State *‘ainda fica a dever’* (is instead deep in debt). The expenses were vastly higher than the income of the Province and whereas the expenses of administration increased daily, the receipts remained stationary.”

There was a certain humour in the Presidente’s remarks on crime, when he referred to the difficulties experienced by the Chief of Police, who received no remuneration.

“It is easy,” he said, “to understand the drawbacks resulting for the maintenance of order and the repression of crime, which is daily becoming more common — owing, no doubt, to the facility of entrance, through our unguarded boundaries, of persecuted people or fugitives from our neighbouring States, and of the impunity of criminals due to the benevolence of our juries. The diminution of our police force in so large a State with such difficult communications has had the result that the police force, moved incessantly from one end of the State to the other, never arrives in time to prevent crime!

“Many criminals have been prosecuted and are now safely guarded in prisons, but unhappily the greater number of criminals are loose all over the State without fear of being prosecuted, and terrorizing the population. Bands of gipsies were followed by officers and soldiers, and their attacks on property and individuals were prevented. . . . In the town of Catalão the two armed parties were successfully prevented from violence and *‘viessem ás mãos’* (coming to blows). At Morrinhos

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armed citizens in a menacing attitude were dispersed by the police . . . in other localities other riots or attempts (*sic*) at disorder were immediately repressed, and we can now say that the State enjoys perfect peace, save the municipality of Douro, which is threatened by bandits from Bahia. They are constantly springing upon the terrified population of the municipality and especially of the town.

" . . . The bandits continue their incursions; murders follow one another in the entire zone between Formosa and Barreiros, including Santa Rita and Campo Largo, the inhabitants of which zone are paralyzed with terror. . . . Our commerce with Bahia, as well as relations between private individuals, is thus interrupted."

In his message the Presidente wisely and frankly disclosed the difficulty of administering justice under existing laws, when juries would absolve proved and confessed murderers wholesale. He endeavoured to stimulate some sense of honour in the officials in charge of the various municipalities, where "*as rendas em geral mal applicadas*" (the revenue generally misapplied) found its way into the channels through which it was not intended to pass.

A fervent appeal the Presidente made to prevent the spread of smallpox. The vaccine which the Government sent to various points of the State was not used.

Curious, indeed, but perfectly true, were his statements regarding the police force.

"The officers are zealous and understand their duty. The policemen, notwithstanding all their defects, are being instructed and disciplined. The policemen are in general 'criminals' (*morigerados*). *Ha falta de armamento, e o existente não é o melhor.* (There is lack of armament and the existing one is not the best.) The pay is small . . . and the body needs reorganization."

UNSATISFACTORY LAWS

The Academy of Law (*Academia de direito*) was not satisfactory and did not answer the purpose for which it was established.

The Lyceum, with its 105 pupils, gave fair results, barring the tolerance in examinations, which, however, did not reach a criminal point (*sic*). It possessed no building of its own, and was badly housed in a private dwelling.

Public instruction was admittedly defective all over the province. The teachers were almost as ignorant and illiterate as the people who went to learn, and perhaps more so; while the Escola Normal (Normal School) for women was almost altogether unattended. The public works were uncared for; there was not a single new work of art begun in the State. Nor could the State boast of a single road or trail or bridge in fair condition.

The laws on the possession of land would one day lead to immense difficulties and confusion. The greater part of the land now occupied was in the hands of people who had no legal right whatever to it.

The existing laws on mining were equally unsatisfactory, and the Presidente rightly remarked that "without facilities and guarantees, capitalists will never venture upon so risky and problematic an enterprise as mining in a State so distant and so difficult of access." He also exhorted the people to re-establish steam navigation on the Araguaya River, such as existed in the days of the Empire.

I was told that a launch had actually been purchased in the United States, but was either waiting at Pará for want of an engineer or else had again been sold, owing to the impossibility — due to lack of money — of its being transported in sections over the rapids above Conceição.

The question of boundaries with neighbouring States was an amusing one. According to some rule for which no one can account, the Government of Goyaz claimed

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from the State of Matto Grosso enormous stretches of land on the opposite side of its natural, indisputable geographical western boundary, the main stream, Araguaya, as well as the isolated settlement of Concepção, on the opposite side of the Araguaya River, which was undoubtedly in the State of Pará. One had only to glance at a map — bad as maps were — to see that in both cases the claim was an absurd one. In the case of Concepção it was perfectly ridiculous. The Pará Government held the place with a military force and occupied the territory with complete jurisdiction. In a more peaceful manner the State of Matto Grosso was in possession of the entire territory west of the Rio Grande do Araguaya, which the people of Goyaz said belonged to them. On the west the Araguaya formed a perfect geographical boundary from the Southern Goyaz boundary, where the Araguaya had its birth, as far as the most northern point of the State; whereas, were one to accept the supposed Goyaz boundary formed by the Rio das Mortes, a tributary of lesser volume than the main stream, it would involve an imaginary, compound, boundary line up the Paredão stream, then up the Rio Barreiros, then an imaginary straight line from north to south across mountainous country, winding its way east until it met the Serra dos Bahus, then again northeast over undetermined country, then along the Rio Aporé and eventually joining the Paranahyba River.

Curiously enough, nearly all the Brazilian Government maps, and all the foreign ones copied, of course, from the Brazilian — all remarkable for their inaccuracies — gave the wrong boundary as the correct one! In any case, both the States of Matto Grosso and Pará were in actual occupation of the respective disputed territories, and Goyaz was much too poor to afford fighting for them, so that I fear her most unreasonable claims will ever remain unsatisfied.

THE FINAL BLOW

The final blow to the financial status of the province was the loan raised on the Banco do Brazil of Rs. 300,000,000 (£20,000 sterling) at an interest of seven per cent per annum. The Presidente counted on the receipts from the exports as well as on economy in administration in order to pay the interest on this sum — a dream which soon became impossible to realize.

It was then attempted to float an internal loan of Rs. 200,000,000 (about £13,334 sterling) at an interest of six per cent; but, as the Presidente pathetically ended his message to the State Congress, “not a single person presented himself to subscribe to the loan.”

The receipts from the export of cattle from Goyaz State amounted in 1910 to only Rs. 171,901,000 (or £11,460 1s. 4d. sterling). After all expenses were deducted, the State of Goyaz then showed a deficit of Rs. 325,510,743 (£21,700 14s. 4d. sterling).

CHAPTER VIII

FOURTEEN LONG AND WEARY DAYS — DISAPPOINTMENT — CRIMINALS AS FOLLOWERS

I HAD entertained hopes of finding suitable followers in the city of Goyaz to accompany my expedition. The officials in Rio de Janeiro had given me glowing accounts of the bravery of the people of Goyaz. According to them, those settlers of the interior were all daredevils, courageous beyond words, and I should have no difficulty whatever in finding plenty of men who, for a consideration, would join the expedition.

“They will one and all come with you,” a well-known Colonel had exclaimed enthusiastically to me in Rio — “and they will fight like tigers.”

I carried the strongest possible, although somewhat curiously worded, credentials from the Federal Government to the Presidente and other officials of Goyaz, the letters, which had been handed to me open, stating that the Presidente was earnestly requested to do all in his power to help to make the expedition a success. When I presented these documents, I explained clearly to the Presidente that all I wished was that he should help me to collect thirty plucky men, whom I would naturally pay, and pay well, out of my own pocket, feed, and clothe, during the entire time the expedition lasted, as well as pay all their expenses back and wages up to the day of reaching their original point of departure.

“I cannot help you; you will get nobody. Besides, I have received an official but confidential message from



AUTHOR'S SIX MEN



VIEW OF GOYAZ CITY FROM STATION BARBARA.



AUTHOR'S MEN PACKING ANIMALS.

INCONCEIVABLE TREACHERY

Rio, requesting me to do all I can to prevent your going on."

Such treachery seemed inconceivable to me, and I took no notice of it. I again requested the Presidente to endeavour to find me men and animals, as nothing would deter me from going on. If no Brazilians came, I said that I would go alone, but that the value of the expedition would naturally suffer, as I should thus have to leave behind all the instruments, cameras, and other impedimenta, which, single-handed, I could not possibly carry.

It was my intention to travel northwest from Goyaz City as far as the river Araguaya. There I wanted to descend the Araguaya as far as the Tapirapez River — a small tributary on the west side of the Araguaya, shown on some of the very incorrect existing maps approximately in latitude 11° south, and on others in latitude 9° and some minutes south. Proceeding westward from that point again, I proposed crossing over to the Xingu River, then to the Tapajoz, and farther to the Madeira River. It was necessary for me to hire or purchase a canoe in order to descend the Araguaya River as far as the Tapirapez.

Believing that perhaps I might be able to find men without the assistance of the Governor, I tried every possible channel in Goyaz. I sent men all round the town, offering high pay. I applied to the commanding officer of the Federal troops. I applied to the Dominican monks, who have more power in Goyaz State than all the officials taken together.

The Father Superior of the Dominicans shook his head at once and told me that, much as he wished to oblige me, I was asking for something impossible. He was right. The people were so scared of the Indians, and of the horrors of camping in the jungle, that no money in the world would ever induce them to move out of their town.

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"Are there no young fellows in the town who will come along for the love of adventure, as well as the money they will get?" I asked.

"For love! . . . love!" said the friar, bursting with laughter. "I do not believe that such a thing exists in Brazil."

Having removed "love or money" from the programme of temptation, there remained little else except patience. In the meantime I endeavoured to hire a canoe. The Presidente kindly undertook to do this for me with the help of a well-known Colonel, one of the most revered men in the city.

"There is only one boat on the Araguaya," said the Presidente to me. "You cannot build a raft, as all the woods in these regions are too heavy, and not one will float. You must hire that boat or nothing."

The honoured Colonel his friend also impressed that point well upon me. "Only that boat or nothing." They also added that they had arranged for me to hire that boat for four days, and it would cost me only £500 sterling. My distinguished friends had taken ten days to arrange that bargain. It took me ten seconds to disarrange it all. All the more as I had heard that a German traveller, Dr. Krause, had the previous year gone down the Araguaya River, where he had done excellent research work, and had also travelled up the tributary Tapirapez, crossing over nearly as far as the Xingu River. He had found in that region no Indians and the country of little interest. Furthermore, on my arrival in Goyaz, I learnt that a Brazilian Government expedition, under the leadership of Dr. Pimentel, had already been in Goyaz some six months, trying to start on a journey down the Araguaya, and, if possible, also to go up the Tapirapez and other tributaries of that great stream. Moreover, the Araguaya was perhaps, after the Madeira, one of the best known southern tributaries of the Amazon. As

STEAM NAVIGATION

we have already seen, during the time of Dom Pedro, the Emperor, there was even steam navigation almost all along the course of the upper Araguaya as far as Leopoldina, the port for the Goyaz capital. Several Englishmen and Germans and very many Brazilians had travelled on that river, where even military posts had at one time been established at intervals on its banks.

So that, rather than be imposed upon and travel for hundreds of kilometres in so well-known a region, I decided slightly to alter my route in order to cover ground that was newer and infinitely more interesting and important.

The Presidente's friend, the highly revered Colonel, had also undertaken to purchase a number of horses and mules for me. "The people of Goyaz," said he, "are terrible thieves; they will swindle you if you buy them yourself. I will purchase them for you, and you will then pay me back the money. By to-morrow morning," he had stated, "I shall have all the horses and mules you require."

This was on the day of my arrival in Goyaz. Twelve days after that date he appeared with a famished, skeleton-like horse—only one—for which he made me pay nearly double what I had myself paid for other excellent animals.

I took care after that experience to beware of the "revered and honest men of Goyaz." Those who behaved honestly were generally those who were described as thieves. Everything is reversed in Brazil, and I should have known better.

Let us have a look around the city as I saw it. Mules and horses were grazing in the principal square on a severe slope; the streets were paved in a fashion calculated to dislocate your feet or possibly break them if you happened to be walking out after dark. There was not the slightest semblance of drainage in any part of the town.

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The people flung out into the streets all that could be flung out, and also a good deal that should not be flung. The dirt was excessive all over the place, when the rain did not come to the rescue and wash it all off.

The boast of the town was its brilliant illumination: one hundred petroleum lights all told, lighted up until ten p.m. when there was no moon. When there was, or should have been a moon, as on stormy nights, the municipality economized on the paraffin, and the lamps were not lighted. I do not know anything more torturing than returning home every night after my dinner at the palace, walking on the slippery, worn stone slabs of the pavements, at all angles — some were even vertical — in the middle of the road. You stumbled, slipped, and twisted your feet, jamming them in the wide interstices between the slabs. I never could understand why the municipality troubled to have lights at all. They gave no light when they were lighted, at least not enough to see by, and they were absolutely of no use to the natives themselves. By eight o'clock p.m. all the people were barricaded within their homes and asleep.

Yet — can you believe it? — in this mediæval city you would be talked about considerably and would give much offence if you went out of your house in clothes such as you would wear in England in the country. On Sundays and during all Easter week, when I was there, all the men went out in their frock-coats, top hats of grotesquely antiquated shapes, extra high starched collars, and, above all, patent leather shoes — with the sun scorching overhead. The women were amusing enough in their finery, which perhaps had been the fashion elsewhere fifty or sixty or more years ago. But they believed they were as well-dressed and quite as up-to-date as the smartest women of Paris or London. They never let an opportunity pass of telling you so.

The most striking building in the principal square of

SANITARY ARRANGEMENTS

Goyaz was the prison. I visited it in the company of the Chief of Police. The place had been specially cleaned on the occasion of my visit, and that particular day it looked quite neat. I was shown very good food which — at least that day — had been prepared for the prisoners. Nearly all the prisoners were murderers. “But the biggest criminals of all,” said the Chief of Police to me, “are not inside this prison; they are outside!” The poor devils inside were mere wretches who had not been able to bribe the judges.

Curiously enough, petty theft was considered a shame in the Province of Goyaz, and was occasionally severely punished; whereas murderers were usually set free. I saw a poor negro there who had stolen a handful of beans and had been sent to five years’ penal servitude, while others who had killed were merely sentenced to a few months’ punishment. In any case, no one in Brazil can be sentenced to more than thirty years’ detention, no matter how terrible the crime he has committed.

The display of police guarding the prison was somewhat excessive. There were fifty policemen to guard fifty prisoners: policemen standing at each door, policemen at each corner of the building, while a swarm of them occupied the front hall. The various common cells were entered by trap doors in the ceiling, of great height, and by a ladder which was let down. Thus escape was rendered improbable, the iron bars of the elevated windows being sounded every morning and night for further safety.

The sanitary arrangements were of the most primitive kind, a mere bucket in a corner serving the needs of eight or ten men in each chamber.

As there was no lunatic asylum in Goyaz, insane people were sent to prison and were kept and treated like criminals.

I noticed several interesting cases of insanity: it

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generally took either a religious or a criminal form in Brazil. One man, with a ghastly, degenerate face, and his neck encircled by a heavy iron collar, was chained to the strong bars of a window. His hands and feet were also chained. The chain at his neck was so short that he could move only a few inches away from the iron bars. He sat crouched like a vicious dog on the window-ledge, howling and spitting at us as we passed. His clothes were torn to shreds; his eyes were sunken and staring; his long, thin, sinewy arms, with hands which hung as if dead, occasionally and unconsciously touched this or that near them. I tried to get close, to talk and examine him; but his fury was so great against the policeman who accompanied me that it was impossible to get near. He was trying to bite like a mad dog, and injured himself in his efforts to get at us. Another lunatic, too — loose in a chamber with other prisoners — gave a wonderful exhibition of fury, that time against me, as he was under the impression that I had come there to kill him! He was ready to spring at me when two policemen seized him and drove him back.

There was a theatre in Goyaz, a rambling shed of no artistic pretensions. The heat inside that building was stifling. When I inquired why there were no windows to ventilate the place, I was told that a leading Goyaz gentleman, having once travelled to St. Petersburg in Russia in winter-time, and having seen there a theatre with no windows, eventually returned to his native city, and immediately had all the windows of the theatre walled up, regardless of the fact that what is suitable in a semi-arctic climate is hardly fit for a stifling, tropical country.

One thing that struck me most in Goyaz was the incongruity of the people. With the little literature which found its way so far in the interior, most of the men professed advanced social and religious ideas, the majority

A RELIGIOUS PROCESSION

making pretence of atheism in a very acute form. "Down with faith: down with religion: down with the priests!" was their cry.

Yet, much to my amazement — I was there in Easter week — one evening there was a religious procession through the town. What did I see? All those fierce atheists, with bare, penitent heads stooping low, carrying lighted candles and wooden images of our crucified Saviour and the Virgin! The procession was extremely picturesque, the entire population, dressed up for the occasion, being out in the streets that night, while all the men, including the policemen and federal soldiers, all bareheaded, walked meekly along in the procession, each carrying a candle. When the procession arrived at the church, the Presidente himself — another atheist — respectfully attended the service; then the priest came out and delivered a spirited sermon to the assembled crowds in the square. Then you saw those atheists, old and young, civil and military, again kneeling on the hard and irregular paving-stones, where some had taken the precaution to spread their handkerchiefs so as not to soil their trousers, beating their chests and murmuring prayers, and shaking their heads in sign of repentance.

Such is the world! The prettiest part of the procession was that formed by the young girls, all garbed in immaculate white, and with jet-black hair — masses of it — hanging loose upon their shoulders. The chanting was musical, and the whole affair most impressive.

I had received somewhat of a shock in the morning on passing the principal church; there were five or six in Goyaz. Spread out upon the pavement was the life-size, wooden figure of our Saviour, which had evidently long been stored in a damp cellar, much mildewed, and left in the sun in preparation for the evening performance. The red wig of real hair, with its crown of thorns, had been removed and was drying upon a convenient, neigh-

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bouring shrub! Really, those people of Goyaz were an amusing mixture of simplicity and superstition.

One great redeeming point of the people of Goyaz was that they were extremely charitable. They had erected a huge building as a workhouse. It was entirely supported by charity. A small library had also been established.

As I have elsewhere stated, I needed for my expedition no less than thirty men, so that they could, if necessary, carry all my instruments, cameras, provisions, ammunition, etc., where animals could not get through.

Fourteen long and tedious days elapsed in Goyaz. No one could be induced to come. In despair, I sent a despatch to the Minister of Agriculture, asking for the loan of at least four soldiers, whom I should naturally have paid out of my own pocket, as I had duly explained to the Presidente, who backed my request. To my regret, I received a reply from the Minister of War saying that at that moment the Government could not possibly spare four soldiers. It must be said that although the men of Goyaz did not shine for their bravery, it was not so with the ladies, several of whom offered, if necessary, to accompany the expedition and do, of course, the work of the men. I believe that they meant it.

I have, indeed, the greatest respect and admiration for the noble self-sacrifice of the women of Goyaz. Devoted mothers and wives to men who deserved no devotion at all — nearly all the men had concubines — gentle, humble, thoughtful, simple, and hard-working, they did all the work in the house. They were a great contrast to the lazy, conceited, vain male portion of the population. Certainly, in a population of 10,000 people, I met two or three men who deserved respect, but they were the exception.

If the men were so timid, it was not altogether their fault; they could not help it. A look at them was enough

CRIMINALS AS FOLLOWERS

to show that no great feats of bravery could be expected of them. They were under-developed, exhausted, eaten up by the most terrible complaint of the blood. The lives in which they merely vegetated were without any mental stimulus. Many suffered from goître; others had chests that were pitiful to look at, so under-developed were they; all continually complained, every time you spoke to them, of headache, toothache, backache, or some other ache. They were always dissatisfied with life and with the world at large, and had no energy whatever to try and improve their condition. They were extremely polite; they had a conventional code of good manners, to which they adhered faithfully; but that was all.

At the end of the fourteen days in Goyaz, I had been able to purchase a good number of mules and horses — at a very high price, as the people would not otherwise part with their quadrupeds. Also I had collected all the riding and pack saddles and harness necessary, a sufficient quantity of spare shoes for the animals, a number of large saws, axes, picks, and spades, large knives for cutting our way through the forest, and every possible implement necessary on a journey of the kind I was about to undertake. Everything was ready — except the men!

Alcides Ferreiro do Santos and Filippe da Costa de Britto, the two men lent me by Mr. Louis Schnoor in Araguay, upon seeing my plight, were at last induced to accompany the expedition at a salary of close upon a pound sterling a day each.

At the last moment the Presidente came to my rescue. He supplied me with six men.

“They are criminals,” he said to me, “and they will give you no end of trouble” — a fact fully demonstrated three hours later that same evening, when one of them — an ex-policeman — disappeared forever with a few pounds sterling I had advanced him in order to purchase clothes. Another fellow vanished later, carrying away

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some forty pounds of coffee, sugar, knives, and other sundries. So then I had two criminals less.

I packed my animals, and was about to depart with the four remaining rascals and the two Araguary men—six all told—when a policeman, sent in haste, called me to the palace. The truly good-hearted Presidente and his charming family were in a great state of mind. They told me that my men had gone about the town the previous night drinking, and had confided to friends that they were merely coming with me in order to murder and rob me of all I possessed as soon as they had an opportunity. It was an open secret that I carried a very large sum of money upon my person, as after leaving São Paulo City it was impossible to obtain money by cashing cheques on letters of credit or other such civilized means, and it was imperative for me to carry several thousand pounds sterling in cash, in order to be able to purchase horses, mules, boats, food, and pay the men, as long as the journey should last.

When you stop to consider that I had before me the prospect of not replenishing my exchequer for at least one year, or perhaps even two years or more, it will be easily understood that if one wants to travel, and travel quickly as I do, there is no other possible way than to carry the money with one in hard cash. The risk was certainly enormous, although no one except myself ever really knew the amount that I actually carried. A large portion of that sum was in Brazilian notes, a good deal in English bank-notes, and some four hundred pounds sterling in English gold. As I could trust nobody, that sum, except what I gradually spent, and barring the few moments when I took my daily morning bath, never left my person, even for a few minutes, for the entire period of one year. Most of the notes were contained in two bulky leather bags and the gold was in a third, attached firmly to a strong belt which day and night, much to my discomfort,

HOW THE MONEY WAS CARRIED

encircled my waist. The larger bank-notes, letters of credit, etc., were divided into my various coat, shirt, and trousers pockets. The gold was so heavy that it caused with its friction a large sore on my right hip — a sore which remained there more or less for an entire year.

“You cannot start under such conditions,” said the Presidente appealingly. “I cannot furnish other men. No one will go, notwithstanding the high pay you give them.”

I thanked the Presidente for his exquisite kindness, and for the very generous and thoughtful hospitality he and his delightful family had offered me in Goyaz, and which left in my mind the only pleasant moments spent in that dull city.

CHAPTER IX

THE DEPARTURE — DEVoured BY INSECTS

A FEW minutes later I had again joined my caravan, watched intently, at a respectful distance, by a few astonished natives of Goyaz. As soon as all my mules and horses had been packed — they were very heavily laden — I took my departure in a direction north-west by west. The six men mounted on mules came along. I had armed all my followers with the best repeating carbines that are made, as well as with excellent automatic pistols, and the long daggers locally used; but personally I carried no weapons of any kind.

Having been unsuccessful in obtaining sufficient men from the officials of Goyaz, there yet remained for me one last faint hope. It was to try to get a few followers from the Indian colony of the Salesian friars, a few days' journey west of the Araguaya River.

On April twenty-sixth, from the height of Santa Barbara (elevation 2,150 feet above the sea level), a picturesque chapel and graveyard to the west of the city, I bade good-bye for good to Goyaz City (elevation 1,950 feet). One obtained from this point a fine view of the entire city, spreading from north to south, at the bottom of the imposing frame of mountains on the south with their extraordinary columnar formation. Each natural column, with its mineral composition and crystallization, shone like silver in the bright light. The *ensemble* from our point of vantage resembled the set of pipes of an immense church organ. High hills stood to the east. In the

THE FIRST MUTINY

distance, to the southwest, the lower country was open, with the exception of mountains in the far background.

We marched rapidly enough across wooded country until we crossed the Rio Vermelho (elevation 1,750 feet). My men became very excited and began firing their carbines recklessly. I had handed to them fifty cartridges each, with strict instructions not to fire without my orders. I was some distance off. When I heard the fusillade, I immediately galloped to the spot. The men had blazed away nearly all their ammunition, nor would they cease firing when I ordered them until they had exhausted their supply of 300 cartridges in all. Why were they firing? Because, said they, they had crossed the first water on their journey.

My heart absolutely sank into my boots when I realized that it was my fate to travel with such contemptible imbeciles for perhaps a year longer or more, and that was only the first day! Oh, what a prospect! We had our first quarrel when the men demanded to have their belts replenished with cartridges, for their protection against attack. As I refused to let them have them, there was a mutiny, the men declining to go on another yard unless the cartridges were handed to them. We had not been gone more than three hours, and a mutiny already! With a great deal of patience I induced them to go on, which they eventually did with oaths and language somewhat unpleasant. Still I held firm.

After several ascents and descents and a great many mishaps with our mules, unaccustomed yet to the work, we made camp, having marched 18 kilometres on the bank of the Rio Agapa (elevation 1,650 feet), near which the grazing was fair.

Two mules escaped during the night, and we could make only a late start the next morning. Alcides traced them all the way back to Goyaz, where he recovered them. Up and down we went, from 1,760 feet to 1,550 feet, at

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which elevation we crossed the Rio Indio, with a beautiful rocky bed; the banks showed strata of red and grey clay and the delicious water was crystalline. No fossils of any kind were to be seen anywhere, although I looked hard in search of them all the time. The country was undulating and fairly thickly wooded near streams; otherwise it consisted mostly of campos, at the highest point of which another beautiful panoramic view of the escarpment in the plateau we had left behind could be obtained. The elevation was constantly changing between 1,750 feet and 2,050 feet above the sea level. Burity and other palms were plentiful. We crossed that day three streams, the last one the Rio Uva.

In a distance of 38 kilometres we saw only a miserable shed, although we passed a site where a ruined house and paddock showed that once there must have been quite an ancient and important farm. Yes, indeed, Goyaz State had seen better days in the time of the Emperor and when slavery was legal. With the present lack of population and the prohibitive prices of labour, it was impossible to carry on farming profitably.

The landscape was everywhere beautiful, but one never saw a bird, never perceived a butterfly, nor any other animal life of any kind. I was just remarking this fact to Alcides when a snake, eight or nine feet long, crossed at a great speed in front of my mule. The mules and horses were rather frightened at first of snakes, and it was amusing to watch how high they stepped when they saw them and tried to escape from them. We were in great luck. A flock of six beautiful red *araras* (macaws) passed above our heads. They looked perfectly gorgeous as they flapped their wings heavily and shrieked loudly as they sped along.

The formation of the soil in that region was interesting enough. Under a greyish white surface layer there were thin, sedimentary strata of pebbles, deposited evidently

SOME OF THE AUTHOR'S PACK ANIMALS.





AUTHOR'S CARAVAN ACROSS THE IMMENSE PRAIRIES OF MATTO GROSSO.

ANIMAL LIFE

by water; then under these a thick stratum — 30 feet or more — of warm-coloured, red earth. The streams which had cut their way through this geological formation were invariably limpid in the extreme.

We were beginning to find beautiful flowers and butterflies again, the latter in great swarms near the water.

My caravan of grey and white pack-animals, some fourteen in all, was quite a picturesque sight as it wound its way down steep hillsides, the mounted men urging the mules with shouts and lashes from their whips. We experienced difficulty in finding a good camp that night, the grazing being poor and the water scarce when sunset came. It seemed a pity that the most suitable camping places were not always to be found when you wished to halt!

We were now at an elevation of 1,550 feet. When we proceeded the next morning, we found nothing of interest. Fairly wooded country alternated with campos, at first rather undulating, then almost flat, until we arrived at the Tapirapuana River (elevation 1,350 feet), 8 yards wide and 3 feet deep, which we crossed without much trouble, in the afternoon, at a spot some 28 kilometres distant from our last camp. Luxuriant foliage hung over the banks right down into the water, which flowed so slowly — at the rate of only 1,080 metres an hour — that it looked almost stagnant, and of a muddy, dirty, greenish colour.

We were much troubled by mosquitoes, flies, and *carrapatinhos*, the latter a kind of tiny little clinging parasite which swarmed absolutely all over us every time we put our feet on the ground on dismounting from our animals. The irritation was such that you actually drove your nails into your skin in scratching yourself. They could be driven away only by smearing oneself all over with tobacco juice, the local remedy, or with strong carbolic soap, which I generally used, and which worked even more satisfactorily.

A tubercular leper came to spend the evening in our

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camp. He was most repulsive, with his enlarged features, especially the nose, of a ghastly, shiny, unwholesome, greenish white, and pitifully swollen feet and hands.

The heat was not unbearable in that region — 89° Fahrenheit in the shade, 105° in the sun. There was a breeze blowing that day from the northeast, with a velocity of 200 metres a minute by anemometer.

A good portion of the following day was wasted trying to recover four animals that had escaped. In order that they might graze properly it was necessary to let them loose. They sometimes strayed away long distances. Occasionally they hid in the shade of the *matto* (forest and shrub), and it was easy to miss them while looking for them. Luckily, two of my men, Alcides and a man called Antonio, were excellent trackers, and sooner or later they were generally able to locate and bring back the animals, which was not at all difficult, as one had only to follow the marks of their hoofs to find where they had gone.

We departed late in the afternoon through thick shrub, over marked undulations, in some spots quite steep. From the highest point that day (elevation 1,900 feet) we obtained an extensive view of flat tablelands in the distance to the east, with a low hill-range standing in front of them. It was scenery quite typical of Central Brazil, with no irregular, striking mountains; but everywhere we had plenty to study in the effects of erosion on that great continent.

I tried to make up for time lost by marching at night, a most trying experience, as my men, unaccustomed to the work and frightened at every shadow, let the mules stray in all directions. I unfortunately had to hand over to my followers a few cartridges each, or else they would not come on. Every now and then that night they fired recklessly in the dark — much to the danger of beasts and men alike — thinking they had seen an Indian, or a

THE CARRAPATO

leopard, or some other wild animal. I was glad when we arrived in camp and ascertained that no one had been wounded.

That night-march demoralized animals and men alike. Most of the animals strayed away during the night, as the grazing was bad where we halted. I was compelled to halt for two days in that miserable spot, simply devoured by flies and mosquitoes and *carrapatos*, in order to recover them.

If you do not know what a *carrapato* is, let me tell you. It is an insect of the order Diptera and the genus *Mosca pupiparas*, and is technically known as *Melophagus ovinus*. Its flattened, almost circular body varies in size from the head of an ordinary nail to the section of a good-sized pencil. Like the *carrapatinho* — its miniature reproduction — it possesses wonderful clinging powers, its legs with hook attachment actually entering under the skin. Its chief delight consists in inserting its head right under your cutaneous tissues, wherefrom it can suck your blood with convenient ease. It is wonderfully adept at this, and while I was asleep, occasionally as many as eight or ten of these brutes were able to settle down comfortably to their work without my noticing them; and some — and it speaks highly for their ability — were even able to enter my skin (in covered parts of the body) in the daytime when I was fully awake, without my detecting them. I believe that previous to inserting the head they must inject some poison which deadens the sensitiveness of the skin. It is only after they have been at work some hours that a slight itching causes their detection. Then comes the difficulty of extracting them. If in a rash moment you seize the carrapato by the body and pull, its head becomes separated from its body and remains under your skin, poisoning it badly and eventually causing unpleasant sores. Having been taught the proper process of extraction, I, like all my men, carried on my person a

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large pin. When the carrapato was duly located — it is quite easy to see it, as the large body remains outside — the pin was duly pushed right through its body. The carrapato, thus surprised, at once let go with its clinging legs, which struggled pitifully in the air. Then with strong tobacco juice or liquefied carbolic soap, or iodine, you smeared all round the place where the head was still inserted. The unpleasantness of these various beverages immediately persuaded the brute to withdraw its head. You could then triumphantly wave the pin and struggling carrapato in the air. You were liberated from the unpleasant visitor. It was not uncommon while you were extracting one — the operation took some little time — for two or three others to find their way into your legs or body. I fortunately possess blood which does not easily get poisoned, and felt no ill effects from the hundreds of these brutes which fed on me during the entire journey; but many people suffer considerably. My men, for instance, had nasty-looking sores produced by the bites of the carrapato. The mules and horses were simply swarming with these insects, which gave them no end of trouble, especially as they selected the tenderest parts of the skin in various localities of the body to settle upon. Where an animal had a sore, it would soon be swarming with carrapatos near its edge. It would then putrefy, and maggots in hundreds would be produced inside the wound almost within a few hours.

There was, near by, an old *moradoria*, a large patch of *muricy* trees (*Byrsonima*), of which various species exist. These were not unlike small olive trees and produced a small sweet fruit quite good to eat.

We went for 22 kilometres through a forest with beautiful fan palms over 30 feet high. There was no animal life. We crossed three streamlets, the country between being undulating. Between the last two streams we came across rock showing through the alluvial de-

A USELESS TASK

posits. It was an interesting conglomerate of minute crystals cemented together by hardened clay, the whole forming large blocks.

More trouble was in store for us. One of my mules was seriously injured. Its spine was so badly strained that it was quite disabled for further work. My cook, who had a slight attack of indigestion, wished to be left there to die, and declined to proceed any farther. With true Brazilian reasoning he wished, nevertheless, to be paid off before dying. With true English reasoning I explained to him that money would be of little use to him in the next world. If he really intended to die, I would certainly not pay him, but his wages would naturally go on while he was alive, continued the journey, and did the cooking. He quickly returned to life, and to his senses.

Really, in the entire experiences of my travels I have never come across more pitiable specimens of manhood than those fellows. They absolutely gave me a sick feeling that I never lost while they were with me, for many, many months to come. The animals, too, were almost as bad as the men. They had little endurance, they had no courage; everything seemed to affect them. The worst Abyssinian mule, for instance, was, for equal work, vastly superior to the best Goyaz mule. It was a useless task to try and train those animals. On my many previous expeditions I had been able to win the affection of my animals, and was able to train them in a few days so that they obeyed with the perfection of soldiers, but in Brazil, the last day I had them after the several months that they had been with me, they were just as disobedient and stupid as on the first day. In fact, they never even seemed to recognize us again. They had learnt absolutely nothing, except bad habits. Everything seemed to frighten them. One mule, for instance, was afraid to cross small streams. Its legs invariably began to quiver on entering the water, and down would go mule and baggage into the water.

ACROSS UNKNOWN SOUTH AMERICA

All the thrashing in the world could not make it get up. We had to drag the brute bodily across the stream, when it would jump up on its legs again. It was quite futile to try and prevent that animal from collapsing every time it had to go across water. So that, on approaching any streamlet, we had to unload it, in order to keep the baggage at least from getting soaked.

The interior of Brazil — even comparatively near a city, as we were still to Goyaz — did not compare in civilization with the lowest and poorest countries of Central Asia or Africa. Humble countries like Persia and Beluchistan or Abyssinia some ten or fifteen years ago were more advanced than Brazil to-day. They had good trails on which a regular postal service was established, there were regular rest-houses on those trails, and horses or camels could easily be hired and exchanged at the different stations, so that one could travel comparatively quickly. It was not so in Brazil. Even if you wished to take a short journey of a few days from a city, you had to purchase your horses or your mules, and have the riding and pack saddles made for you at a high cost.

As we have seen, even in the city of Goyaz itself, there did not exist a single hotel, nor did we find a proper rest-house in the 531 kilometres between the railway terminus and the Goyaz capital. Nor is there one of these conveniences west, between Goyaz and Cuyaba, the capital of Matto Grosso. Of course there were no hotels because nobody travelled, but it can also be said that many people do not care to travel where there are no hotels. In so humble and poor a country as Persia you always could indulge in a delicious bath in every caravanserai, which you found in the remotest spots all over the country. In Brazil you have to resort to the streams, and the moment you remove your clothes you are absolutely devoured by mosquitoes, flies, and insects of all kinds — a perfect torture, I can assure you. Once

UNPLEASANT BATHING

you were in the water, immersed up to the mouth, it took a brave man to come out again, as millions of mosquitoes and flies and gnats circled angrily and greedily above your head, ready for the attack the moment you appeared.

We were travelling all the time at elevations varying from 1,450 feet at our last camp, to 1,400 feet at our present camp, the highest elevation between these two places being on a rocky hillock about 100 feet higher than those altitudes.

Our camp was on a streamlet flowing from south to north, of milky water containing lime, which made our tongues and gums smart when we drank it.

Again, on May third we went through forest all the time, with wonderful palms and many medicinal plants. Alcides had an extensive knowledge of the curative qualities of the various plants. Various species of the *Caroba* (*Bignoniaceæ*), very beneficial, they say, as a blood purifier, especially in the worst of terrible complaints, were plentiful there. Giant nettles, the *Ortiga* or *Cassausan*, as it is locally called, were also frequently noticeable, especially when we passed too near and were stung all over by them.

We had risen to 1,200 feet on the summit of a range called O Fogo. From it we had another exquisite view of the mountain range called Bucainha, which we had left behind to the east. It had a marked erosion on its north side.

On the west side of the pass we found curious small domes, as well as pillars and other rocks of columnar formation. We had met during the day many *Aricori* palms, which, I was told, produced a sweet fruit excellent to eat when ripe, in the month of November.

After a steep, rocky descent, we made our camp. We halted earlier than usual. I was sitting outside my tent while my dinner was being cooked. I could not help smiling at the warlike array which had been necessary

ACROSS UNKNOWN SOUTH AMERICA

in order to make a start from Goyaz. The camp was a regular armoury. Beautiful magazine rifles, now rusty and dirty owing to the carelessness of the men, were lying about on the ground; revolvers and automatic pistols stuck half out of their slings on the men's belts, as they walked about the camp; large knives and daggers had been thrown about, and so had the huge, heavy, nickel-plated spurs of the men, with their gigantic spiked wheels. These wheels were as much as two inches in diameter and even more. It was the habit of Brazilians to wear the spurs upside down, so that when they got off their mounts they had to remove them or it would have been impossible for them to walk. Naturally, worn like that, they were much more effective, and were intended to torment the animals with greater success.

I reprimanded the men for keeping their weapons so dirty. One man thereupon sat himself three feet away from me and proceeded to clean his rifle, keeping the muzzle pointed constantly at me. On my suggesting that he might point the weapon in another direction, he roughly replied the usual thing: "There is nothing to be afraid of, it is not loaded," and he was just about to pull the trigger, the gun pointed straight at me, when I leapt up and snatched it out of his hands. There was a cartridge in the barrel and several cartridges in the magazine.

During the night the fusillade was constant. It was enough for the men to hear a leaf fall. Immediately there was an alarm and the rifles were fired. Once or twice the bullets came so unpleasantly near me that I suspected they were intended for me. I thanked my stars that my men were bad shots. To make sure of this fact, I one day had a shooting competition. After that I became quite assured that it was sufficient to be at the spot where they aimed to consider myself in absolute safety. It was not so, of course, when they aimed somewhere else. I did not care to take away the cartridges

TORTURING SADDLES

from them altogether, as they would have then imagined that I was afraid of them, an impression which it would have been fatal to let them entertain even for a moment. Each man was allowed to replenish his belt each day to the extent of ten cartridges.

I have elsewhere referred to the absurd pack-saddles used in Brazil, so heavy and unsteady when going over rough country, with the underpads so difficult to adjust that the animals were soon a mass of sores on the back, the sides of the body, on the chest and tail. I had other lighter and more sensible saddles, but I had to discard them, as the Brazilians would not hear of using them, and I gave up in despair of teaching them how to pack them. I eventually left those saddles behind.

The riding-saddles, too, were almost as absurd as the pack-saddles, constructed as they were of innumerable and useless pieces of wood, iron, and leather. The stirrups were gaudy, and consisted of a regular shoe of silver or other metal, into which you inserted the greater part of your foot, or else of a much ornamented circular ring. The head-piece and bit were also extremely heavy, clumsy, and highly decorated, for everything must be made for show if it has to be used in Brazil.

It was not possible to associate in any way or be friendly with my men. They were unpleasant beyond all conception. One could not say a word, no matter how kind, without the prospect of a long argument or a row. It was quite beyond them to be civil, and, like all ignorant people, they always imagined that they could teach others everything, including good manners! They were ridiculously courteous to one another; a muleteer talking to another always addressed him as "Sir," and referred to his comrades as his "colleagues."

We travelled that day nearly altogether over finely powdered reddish earth of volcanic origin. I had so far not met with a single fossil, not a shell, not a petrified

ACROSS UNKNOWN SOUTH AMERICA

bone of any animal, nor, indeed, impressions on rock of leaves, twigs, or other parts of plants. The farther one went on, the more one had proof that that portion at least of the American continent had never been submerged in its entirety.

Some rocks displayed on the surface peculiar perforations such as would be produced by incessant water dripping over them, but these were caused, I think, merely by water falling over them while they were in a molten state; other rocks were thoroughly polished on the surface, as if sand or other gritty substance had flowed with great force over them, mixed with water — perhaps during a period of volcanic activity and torrential rains.

Geological research was somewhat difficult for a passing traveller in that region, for everything was smothered in vegetation. Only here and there, in the cuts of rivers, was I able to judge a little better of the actual formation of the land.

We camped on the stream Agua Limpa, which duly deserved its name of “clear water” (elevation 1,470 feet). It flowed south. On May fourth, going through forest again over a hill (elevation 1,650 feet), we obtained a glorious view of the immense expanse to the west and to the southwest — a great stretch of greenish, long, sweeping lines with a plateau in the background. A somewhat taller hill rose at one end of it. We then descended to another deliciously clear river, which deserved as well as the previous one the name of Agua Limpa (elevation 1,450 feet), but this one flowed north into the Rio Claro. The land was fine, sparsely wooded all the time, absolutely flat, but getting slightly undulating beyond that stream. It seemed wonderful land for agricultural purposes.

After passing the Indian River, the Bom Sucesso, and another stream, all three flowing south, we swerved more to the northwest, climbing up on an elevated spot, from which we obtained another glorious panorama. A

THE WORK OF UNCOUNTABLE AGES

high Serra lay to the west, another in the distance to the east, the two extending almost parallel towards the south, where the gap in the horizon line between these ranges was filled by a very distant range, showing a conical peak, and to the west of this another, in the shape of a dome. It was the grandeur of these panoramas that impressed one most, rather than their monotonous beauty.

All the outlines of the scenery of Central Brazil had, so to speak, been worn smooth by the erosive action of water and wind, so that no fantastically shaped mountains had yet been encountered, no landscape which some great commotion had rendered strangely picturesque. There, only the steady work of uncountable ages showed itself in a most impressive way to those who understood. From a pictorial point of view very little remained in one's mind of those wonderful scenes after one had turned one's head away, except, perhaps, their immensity and the deep green tones — their two salient points.

When we had descended from the pass (elevation 1,650 feet) we came to the Rio Tres de Majo, where a hamlet of three sheds was found. Twenty-eight kilometres from our last camp we arrived at the Rio Rancheria, where stood a miserable farm. Both those streams, at an elevation of 1,300 feet, flowed into the Rio Claro to the north.

We had the misfortune to halt near the farmhouse, and suffered tortures from the millions of mosquitoes, gnats, carrapatos, and carrapatinhos which made that night almost unbearable. I invariably found that carrapatos and carrapatinhos were more plentiful where living people or animals were to be found. Near those dirty farmhouses we were simply swarming all over with them. My poor animals, owing to the long marches we had been making, and the terrible pack-saddles, had sore backs, loins, and chests. Yet we could not stop, and the poor things had to stand the pain and strain.

CHAPTER X

FISHING — TERMITES — THE GREAT ARAGUAYA RIVER

AN amusing incident happened. A cow chewed up the coat of one of my men, which was lying on the ground. In his fury, the owner of the coat, on discovering the misdeed, seized his carbine and fired four shots at the cow and four at the farmhouse. None of us could tell where the bullets went. The cow, startled by the shots, gave a few jumps and kicks, then, absolutely uninjured, peacefully continued grazing. The house, too, remained untouched. Amazing shots my men were!

Across almost flat country we reached the Rio Claro — “the Limpid River” (elevation 1,250 feet above the sea level), 200 yards wide, and flowing by a winding course in a general direction of southwest to northeast. Wide beaches of sand and fine gravel were to be seen on the convex or inner curves of its channel. Along the banks there was luxuriant vegetation, which hung down and dipped into the water.

Diamonds were to be found in that river. At low water curious eruptive, highly ferruginous rocks showed in the river bed, some in the shape of spherical balls riddled with perforations, as if they had been in a state of ebullition, others as little pellets of yellow lava, such as I had before encountered between Araguay and Goyaz, and which suggested the spluttering of molten rock suddenly cooled by contact with cold air or water.

We encamped some three kilometres from the Rio Claro, on the streamlet Arejado, where again we were

ANOTHER MUTINY

devoured by mosquitoes. Although we all had thick mosquito nets, and although we slept wrapped, head and all, in our respective blankets, the brutes managed to find their way in and stung us with incredible vigour. We were fresh blood for them. The irritation caused by their bites was a torment.

We were now getting closer to the country where we were to meet the terrible wild Indians, the most ferocious and cruel cannibals on earth, according to the accounts heard in Goyaz. My men were already beginning to lose heart. With the sleepless night due to the mosquitoes, and the heavy atmosphere caused by a fast-approaching thunderstorm, they were morose in the morning. With the exception of Alcides and the negro Filippe, they came insolently forward and refused to go any farther. They shoved the muzzles of their rifles under my nose; they wished to be paid up instantly and go back. With a little patience it was easy to get out of difficulties of that sort, if you possessed the gift of keeping calm.

Faithful Alcides, who had a fiery temper, seized his rifle and was about to fire at them, when I took the weapon from him.

“Do not shoot them, Alcides: these men have been good (*sic*) until now because they were in good health. They are bad now because they are ill. I will cure them.”

And so saying I felt the pulse and forehead of the astonished rioters.

“Yes, indeed, these men are very, very ill. They need medicine. Alcides, get the castor oil — the large tin.”

I had two kinds of castor oil: one tasteless — *pour façon de parler* — for my own use and cases of serious illness; another in large tins, of the commonest kind, with an odour that would kill an ox, which I used occasionally for punishment on my men when they were disobedient.

Alcides, who quickly entered into the spirit of that

ACROSS UNKNOWN SOUTH AMERICA

little joke, immediately produced the deadly tin, collecting upon the ground the four cups belonging to the strikers. Taking my instructions, he poured some four ounces of the sickening oil into each cup — and perhaps a little more. I handed a cup to each man and saw that he drank it. They all eventually did so, with comic grimaces and oaths. The men, I must tell you, had great faith in my powers as a medicine man. Once or twice before I had cured them of insignificant ailments, and whenever I told them seriously that they were ill they believed, in their ignorance, that they were really ill.

This done, and to put them again in a good temper, I patted them on the back and, handing each of them a fish-hook and a line, sent them all to fish in the river, saying that as they were so ill I would delay my departure until the afternoon.

“That pool, over there,” some three hundred yards distant, I suggested would be an excellent place for them to fish in. In that direction, as meek as lambs, like so many naughty children they all went, carrying the lines away and some *toucinho* (lard) for bait. Alcides, who was an enthusiastic fisherman, also went off with a line, and had good sport. He reported that the other men lay flat on their backs upon the rocks most of the time, groaning and moaning, and basking in the sun instead of fishing. The castor oil in any case had the desired effect that the men did not mutiny again for some time.

We did not leave camp until two p.m. The country was teeming with plants of great medicinal value, such as the *sucupira*, which gave a bean much used in Goyaz to relieve stomach troubles; the *algudanzinho*, with its lovely cadmium-yellow, cup-shaped flower—a plant which was most plentiful in that region, and the root of which is said to be very beneficial for the worst of venereal complaints; and also the *acaraiba*. Many were the handsome wild flowers we came across, principally red and

INTERESTING FISH

yellow; but to my mind they could bear no comparison with even the ugliest European wild flowers. They were coarse in shape and crude in colour, and in their beauty there was the same difference as there would be between the lovely, refined face of an aristocratic woman and that of a handsome, massive, peasant girl.

Water was certainly not lacking in that country. We crossed the Rio Striminho, then the Rio Stacco, flowing from southwest to northeast into a lagoon formed by the Rio Claro. We camped on the bank of the Rio Stacco, and found the water delicious.

The negro Filippe killed a wild boar. My men had a great time preparing a huge dinner. They absolutely gorged themselves. Personally I never touch pig in any shape or form, as I cannot get over the idea that its meat is poisonous for any thoroughly healthy person. It may, of course, not be so to people who are not absolutely healthy. The very sight and odour of it make me quite ill, and I fully share the idea of Mohammedans that the meat, certainly of tame pigs, is most unclean.

As we went on we had good sport, my men taking the greatest delight in fishing in the rivers on the banks of which we halted. The travelling was easy over flat country. We made short marches for some days, in order to let the animals recover their lost strength. In the river Las Almas (elevation 1,250 feet), 20 metres wide and 3 feet deep, flowing northwest, we caught a beautiful *pintado* fish, so called because of its spotted appearance. That fish possessed a huge, flat head, with long feelers, two on the nose, at the side of the nostrils, to be accurate, two under its lower mandible. The mouth was enormous in comparison with the total length of the fish, and could be opened at an extraordinarily wide angle. Inside were most peculiar teeth in sets of twos, while the mouth was lined with thousands of hard, tiny, sharp points. The

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eyes were far back upon the skull. The bony dome of the palate was divided in the centre, and a similar separation was to be observed in the centre of the lower jaw, giving thus a great flexibility to the interior of the mouth. When measured, the length of the head was exactly one-third of the length of the entire fish.

Other fish, too, were caught that day, called *mandibé* or *fidalgo*.

The aspect of the country was gradually changing. During that day's march we had gone over beautiful, open stretches of grassy land, with only a few stunted trees upon them. *Bosquets* or tufts of small palms or other trees were to be seen, raised on small mounds, showing how the country was gradually wearing itself down. Nearly every tree was raised on a mound of grey clay. Some fine specimens of *Lexia* trees, with their peculiarly distorted branches, were to be observed.

Those great scavengers of Brazil, the *Urubu*, of which two varieties were to be found, the *Urubu commun* (*Cathartes atratus*) and the *Urubu rei* (*Cathartes Papa*), a cross between a vulture and a crow, were fairly plentiful now that game was more abundant in the country. They often pierced our ears with their unmusical shrieks. The *urubu* belonged to the vulture family and was found in all tropical South America. It had black plumage, somewhat shaggy, with reddish legs and feet, and bluish, almost naked, head and neck. Like all rapacious birds of its kind, it lived entirely on dead animals and what refuse it could find about the country. Near farms these birds were generally to be seen in great numbers.

We had a delicious breakfast of fish — really excellent eating — which set everybody in a good humour, and then we proceeded over slight undulations (elevation 1,250 to 1,300 feet) through forest until we got to the Ponte Alto (High Bridge) River, so called because — there is no bridge whatever there! The Brazilians are



THE ARAGUAYA RIVER (LOOKING NORTH).



THE ARAGUAYA RIVER (LOOKING SOUTH).



CARAJA INDIAN OF THE UPPER ARAGUAYA RIVER.

ANT-HILLS

really too delightful in their reasoning; and, mind you, it is not done with a mischievous sense of the ludicrous — indeed, no; it is done seriously. The Ponte Alto stream was, like most of the other watercourses of that region, wonderfully limpid.

From that point we were in charming open country, where we could freely breathe the delicious air. Occasionally we saw some *angelin* trees (the *Angelino amargoso* and *Angelino pedra*), technically known as *Andira vermifuga* M. and *Andira spectabilis* Sald.

Nearly all the woods we found had a high specific gravity: the two latter, for instance, 0.984 and 1.052 respectively, and a resistance to crushing of kilos. 0.684 and kilos. 0.648.

Cacti of great size were numerous. We were now in a region where termite-hills (ant-hills) were to be seen in great numbers. They stood from two to three feet above ground, although occasionally some could be seen nearly double that height. Some of the ant-heaps were extraordinary in their architecture, and resembled miniature castles with towers and terraced platforms. Whether they had been built so by the ants or worn down to that shape by the pouring rain and wind, was not so easy to tell.

The more one saw of the termites, the more one disliked them, for they were the most insidious, destructive little brutes of that region. They were ugly in appearance, with their fat bodies of a dirty, greenish-white colour. Nevertheless one could not help having great admiration for those little rascals, which in one night were able to devour the bottom of stout wooden boxes, and in a few hours damaged saddles, clothes, shoes, or any article which happened to be left resting for a little while on the ground. They were even able to make an entire house tumble down in a comparatively short time, if the material used in the construction were wood.

One hated them; yet, when one knew all about them,

ACROSS UNKNOWN SOUTH AMERICA

one had to spend hours watching their actions with a microscope, it was so interesting. They seemed to have two social classes among them, the labouring class and the warriors. To the labourers was given the heavy task of digging underground channels, the surplus earth of which was thrown up with great force through apertures in the soil until the earth so displaced and amassed formed a high heap, riddled in its interior by hundreds of channels and miniature chambers and apartments. To the warriors, really more like a kind of perfect police service, was entrusted the safety of the colony and principally the protection of the young. White ants have many enemies, especially among the larger ants, which carry on regular wars against them; for although ants and termites, commonly called white ants, have many points in common, yet they belong to totally different orders of insects, as can be easily noticed in their structure and development. The peculiar structure of the enlarged heads of the warrior termites was particularly noticeable. Some had a formidable head provided with tentacles and powerful rodent clippers, as well as the peculiar whitish cuirasses in sections of the body. The workers had more normal shapes, the head being better proportioned with the body.

It was enough to split one of the heaps and watch the termites at work to learn a lesson of what devotion and duty mean. In the many passages overcrowded with ants — there was never confusion — you saw hundreds of them, either conveying food or building materials to the various quarters. Some carried leaves, others carried pieces of wood, seeds, or dead insects. If one was not strong enough to convey its load, others came to its assistance, although they generally seemed to resent the help of others in doing their work. I always noticed that when one was in difficulty and others ran to the rescue there generally ensued what seemed to be a row, and the

THE LIFE OF TERMITES

new arrivals hurriedly left, either disgusted or angry, I could not tell which by their minute expression.

Then there were extraordinary fat lady ants, lying flat upon their backs, and with many attendants around them doing massage and general nursing with the greatest possible gentleness and care. If one wanted to see a great commotion, one had only to introduce into one of the chambers a larger ant of a different kind. What struck me was that the moment the fray was over, the termites at once, if perhaps a little more excitedly, resumed their work.

What astonished me more than anything was that they would go on working as if nothing had happened, when I split open one of their dwellings, when many of the channels, which must have been normally in the dark, were then exposed to the light. This made me suspect that their vision was either missing altogether or was very defective.

Nature is a wonderful organizer. The majority of termites, including warriors and workers, were sexless; that was perhaps why they were such good workers, as they had nothing to distract them. The males and females whose duty was merely to propagate and improve the race were provided temporarily with wings, so that they could fly away from the colony and disseminate their love among other winged termites of other colonies. The relation between different colonies was friendly. When their task was accomplished and flight was no more necessary for them, they conveniently and voluntarily shed their wings, leaving merely a small section of the wing root attached to the thorax.

The local name for all kinds of termites was *cupim*, but technically they are known in the order *Neoptera* as *Termes album*. Another variety of insect, the *Psocus domesticus*, was also as destructive as the *Termes album*.

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We frequently met with plants of *caju* or *acaju* or *acajueiro* (*Anacardium Occidentale* L.), on our course. They belonged to the *Terebinthaceæ* group. In a preceding chapter I have already described the red or yellow delicious fruit of this tree. Then we found other interesting trees, such as the *oleo*, the tall and handsome *poinna*, and numerous specimens of the small but good-looking palm *pindova*.

There were not many flowers in that particular spot, barring perhaps an occasional cluster of white flowers, principally *bocca de carneiro*, said to have properties refreshing for the blood.

Near a small stream I noticed some lovely, slender, tall *jeguitiba vermelho* trees (*Couratari estrellensis* Raddi), from 75 to 80 feet high, with branches and clusters of deep green, healthy leaves at the summit only.

There was a little less monotony in the scenery before us that day, for to the west stood, over a long, slightly undulating line, one peculiar, conical hill heavily wooded. In pools of stagnant water were lovely water flowers, and in the neighbourhood of that moisture many handsome burity palms were prominent in the landscape.

We had been mounting gently all the time from our last camp. Early in the afternoon we reached that magnificent river, the Araguaya, over 200 yards wide, although something like between 2,500 and 3,000 kilometres, or perhaps more, from its mouth. Its lovely, placid waters, reflecting with the faithfulness of a mirror the vegetation on the high steep banks as well as the clouds in the sky, made an effective picture. The dead silence, disturbed only by the shouts of my men as they urged the mules to the water-side, was most impressive, the water flowing so slowly that it almost looked stagnant.

Not a mountain, not a hill could be perceived, except one low, humble range of hills to the south. It was on those hills that the great Araguaya had its birth.

THE GREAT ARAGUAYA RIVER

We crossed the great stream, mules, baggage, and all, in three canoes, upon which a platform had been erected. Once landed on its western bank, we were, notwithstanding local boundary quarrels, in the immense State of Matto Grosso, the wildest of Brazil.

CHAPTER XI

THE *TUCANO* — FISH OF THE ARAGUAYA RIVER — A BAD SHOT —
A STRANGE SIGHT

I SEEMED to have no luck on that journey. Everything went wrong all the time. Everything seemed to stand in my way to prevent my progress. My men were demoralized, my mules and horses in a pitiable condition. I called a halt of two or three days in order that we might shoe the animals again and rearrange the pack-saddles. We had, of course, a good supply of new shoes, but the work of shoeing so many animals was hard, especially as I had to do most of it myself, with Alcides and Filippe, the other men being absolutely useless. Add to this a stifling temperature of 90° Fahrenheit.

To make things worse there came a downpour such as I have seldom seen, and which lasted for two entire days. That was the dry season, too! The house in which we had put up, and through the roof of which we could admire the stars at our ease while in bed, was turned into a regular swimming-tank when the rain came. We had a good deal of trouble to keep our things dry, propping them up on improvised stands of stones which we removed from the crumbling walls of the building. Fortunately, most of my pack-saddle cases were air and water tight, so that the contents could not be injured. The wind blew with great fury—at the rate of 460 metres a minute, to be strictly accurate.

There was a humble hamlet at Rio Grande or Porto do Castanho, on the Matto Grosso side, where we had

PORTO DO CASTANHO

crossed the Araguaya River. It was the gloomiest of gloomy places, even in glorious weather. Imagine it on a wet, windy day. The few tiny, one-storied cabins — they could hardly be called houses — were soaked with the storm and looked miserable. The inhabitants were busy baling water from inside their dwellings. Many tiles of the roofs had been blown away, and those that remained had grown extra dark with the moisture, with merely a bluish tinge from the reflected light of the grey sky upon their shiny surfaces. The solitary palm tree at the end of the oblong square looked pitiful, with its long, bladed leaves split and broken by the wind, while the dense foliage along the river banks was now several tones darker and richer than we had seen it before.

Under usual circumstances the *plaza*, or square, was so high above the river that one could not see the water at all, until one went to the edge of the stream, but during flood the river rose as much as 20 feet and occasionally overflowed the greater portion of the square.

The grass of the square — a mere field — alone seemed happy in the damp. Half dried and anæmic from the hot sun, it seemed to have quickly come back to life and vigour in those few hours which had rendered us all miserable. My poor horses and mules, worn and sore, stood dripping and wretched, with quivering knees, in the middle of the square, too miserable to feed, only now and then slashing their long, wet tails to right or left to drive away impertinent flies.

With the storm the temperature had suddenly descended to 75°, and everybody was shivering with cold after the oppressive heat.

Upon the half-rotted wooden cross which stood in front of the church was perched a vulture, so thin and shaggy and soaked and motionless that you might easily have mistaken it for a stuffed bird. It was the very picture of misery. But everybody was miserable; one

ACROSS UNKNOWN SOUTH AMERICA

could not help it. I was, too, who am not much given to being depressed.

While marching or camping in the midst of unspoilt nature, I never felt depressed, no matter what happened, and was absolutely regardless of climatic conditions; but in those miserable settlements, feeble attempts at civilization, I must confess that I used to get low-spirited, too, and often thought what an idiot I had been to leave my happy homes in Florence and in London, in order to come to these wretched places.

After the attempts at baling out the water had proved futile, as there was more coming in than it was possible to fling out, the people in resignation barricaded their doors and windows. Not a soul was to be seen or heard anywhere. The place was absolutely dead. Even after the storm was over, no sign of life could be noticed. The people were all still hiding and trembling in their houses, the comparatively slight but sudden change in the temperature bringing upon most of them attacks of strong malarial fever, which was there prevalent.

At last, splashing her little naked feet along the footpath in the grass, now changed into a streamlet, there approached a little girl with a face as black as coal. She looked terrified as she approached the window out of which I was looking. But she overcame her fright and, prettily stretching out her tiny hand, called out "*Boa tarde!*" (Good afternoon). Her father and mother were ill; would I give her some medicine for them? Soon after, when the sky had cleared, other patients came along, asking for quinine or any medicine I could give them. Others wished to have their teeth pulled out. The Brazilians of the interior had great trouble with their teeth, which were usually in a state of decay.

My own men had wrapped themselves up in their blankets in order to keep warm. They had slept most of the time. They were too cold and lazy even to get up to

A HEAVY STORM

cook and eat their food. None of the houses possessed a chimney, cooking being done outside; nor, of course, were there any sanitary arrangements. Those of my men who had toothache cried and moaned the whole night, as might be expected of children aged six of any other country. I have seldom seen men more sensitive and frightened at pain or illness.

The main structure at Porto do Castanho (Port of the Chestnut Tree, because there should be a chestnut tree there) was the church, a mere barn, which elsewhere but in Central Brazil would not be considered good enough for storing hay, still less for the worship of the Almighty. Not that it was used much for the latter purpose, as there was no priest within several hundred kilometres. The walls of the church were all scraped and dirty, the corners chipped off by passing animals. All the passers-by went and wiped their dirty hands on the walls of the church, perhaps attracted by the whitewash, which none of the other buildings possessed.

The shops — there were two — had nothing for sale, except some locally grown tobacco. In one shop I found some small iron nails, which were sold at the equivalent of 6*d.* each!

May eleventh. The drenching rain continued the entire night, the minimum temperature being 73° Fahrenheit. My poor animals were in a terrible condition the next morning through the damp, the sores having become badly infected. They were in a purulent condition, and contained a mass of maggots, the terrible *bishus*, which were the pest of Brazil. So we had the great job of cleaning them all with a powerful disinfectant as well as washing them with a decoction of warm *barbatimão* (*Stryphnodendron barbatimão* M.), a wood with a great resistance to crushing (K. 1.015) and a specific gravity of 1.275. The decoction, which was really very beneficial for wounds and sores of animals, was made with the bark

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of that tree warmed in water over a fire. Another decoction we frequently used was of salt and *carrapicho* herb, but this was not quite so effective as the former.

My men killed a magnificent *tucano*, a large bird with climbing, inquisitive habits. It possessed an enormous yellow bill of singularly light structure, the point of which was black. The lower part of the bill was of a brilliant red, and of a similar red was the rib of the upper part of the bill. The plumage was of a handsome velvety black on the body and tail, which was quite shiny, while the chest was of a pure white, and the under part of the tail of bright vermilion feathers. White feathers showed at the base of the tail above.

The tucano (*Ramphastos*) is too well known for me to describe it fully again. It is found all over tropical Brazil. There are many different varieties, such as the *Ramphastos vitellinus*, *Ramphastos ariel*, the *Ramphastos Cuvieri*, the *Pteroglossus Beauharnaisii*, or curl-crested tucano, etc., extremely common, especially farther north, near the borders of the Amazon.

I was sorry when my men killed this beautiful bird. I had watched it for some time, as it hopped from branch to branch, dipping its bill into cavities and examining everything that happened below by bending its head attentively, now on one side then on the other, in accordance with its inquisitive habits. It evidently took intelligent interest in our doings. My men had gone out to do their cooking. The bird watched them with the greatest attention—with jerky movements not unlike those of a magpie.

The tucanos have, I believe, been described as stupid; but on the contrary I think they are extremely clever, quite as clever as many parrots or macaws. I observed how shrewd that particular bird was. It would come quite close to us, and examine with really amazing attention what we were doing as long as we were not taking any notice of it, but the moment a man happened to touch

THE TUCANO

a stone or try to point a rifle at it, it would fly a long distance off, with shrill yelps, and would not return until it was quite sure that we were not noticing its presence.

The uses of the enormous bill of the tucano have often been discussed by ornithologists, many of whom believe that the bill is of no use to that bird, and that Nature made in this case a mistake and has not yet had time to rectify it. Scientists frequently allege that Nature makes mistakes, because many of them have never really understood Nature. How could they? They have never been near enough to Nature unspoiled. *Many of them also believe that tucano birds are great fishers, following the notion that many water birds have red or yellow bills of large size. That, too, is another great mistake, for the tucano is eminently a fruit and nut eater, and of course a feeder on worms and insects contained in fruit.

The huge bill, attaining the length of six or seven inches, is toothed at the sides in order to saw the stems of fruit. The shape and size of the bill, far from being a mistake of Nature, are made so in order to enable that bird to dig holes into the bark of trees and to enable it to crush and chew the many curiously shaped fruits found in certain parts of the Brazilian forest. Moreover, the bill is also a great protection to the head in going through the dense foliage, where thorns are innumerable and alive with dangerous insects of great size, which, owing to the length of its beak, can be destroyed at a distance from the bird's most vital organs.

These birds have received the name "tucano" from the noise they make, which resembles "*tok-kan*" very sharply pronounced and with a snap at the end of each syllable.

The tucanos are good climbers, but not good fliers. In fact, their flight is somewhat clumsy and heavy, and they seldom fly long distances. They spend all their time on the higher branches of trees. They are generally to be

ACROSS UNKNOWN SOUTH AMERICA

seen alone or in couples, or perhaps occasionally in flocks of three or four.

What spare moments I had in Castanho, after the storm was over, I spent on the banks of the river, gazing at the magnificent stream.

Looking south, a low hill range could be seen in the distance, with a conical summit rising slightly above the range — the Serra do Cayapo. It was there, as I have said, that the great Araguaya had its birth. It was interesting to note that the head waters of the Araguaya, flowing north, of course, had their birth within an infinitesimal distance of those of two such immense rivers as the Inducassu and the Sucuru, flowing into the Parana, and also near the somewhat unknown Taquary River, flowing into the Paraguay.

It would be possible, although perhaps expensive, by means of raised artificial lakes and locks, actually to join at least one of these southern great rivers to the great Araguaya, and thus, barring some troublesome rapids, form a continuous waterway from south to north across South America, from Buenos Aires, roughly in latitude $34^{\circ} 5'$ south, to Pará, in latitude $1^{\circ} 27' 6''$ south. Imagine a distance by river extending for $33^{\circ} 37' 54''$ (or 3,737 kilometres) in a straight line, as the crow flies, and not less than double that distance if we include the constant turns and deviations in the various connected rivers.

Easier still and less expensive it would be to connect by rail the last two navigable points of those two streams. That will certainly be done some day, when those abandoned regions are eventually populated and properly developed.

There were some rocky falls just below Porto Castanho which prevented navigation as far as the place where we crossed the Araguaya; otherwise the river was navigable from those falls as far as Conceição.

The formation of the clouds over the great Araguaya

EXCELLENT FISHING

River was peculiar. Great clusters of globular clouds generally collected in three distinct strata upon a whitish sky extending high up on the sky vault.

Facing north, the country appeared absolutely flat, and nothing could be seen above the trees as far as the eye or even a telescope could perceive. In that direction the stream, 200 yards wide, flowed through a perfectly straight channel for about one mile.

The fishing in the river was excellent. One night we caught a quantity of fish, — one, a huge *pirarara* weighing 40 pounds, then some *pirahiba* and a *pintado*, the latter 24 pounds in weight. The *pirarara* was an extraordinary-looking fish. It had a long head covered entirely with a hard, bony, granular substance, which could be cracked only by a severe blow with an axe. The eyes were prominent and placed quite close to abnormally long antennæ or feelers. The back of the *pirarara* was bluish black, the centre of the body longitudinally was yellowish, whereas the under part was white. The tail was of a bright vermilion, and the black fins had red edges, which made the huge *pirarara* a really beautiful fish to look at.

The *pirahiba* had a grey back with stripes so faint that they were hardly visible. Its head was flat and anchor-shaped. The eyes, very small, were curiously situated on the top of the head instead of at the sides, owing to the fact that the head was really so flat that it had no sides: it was merely a gentle convex curve from one side of the mouth to the other, over the skull. The *pirahiba* too, like most fish of those rivers, possessed long tentacles. Its mouth and fins were slightly tinted red. It displayed powerful teeth similarly arranged to those of the *pintado* fish previously described.

Then we got some *tubarao* (or *Squalus carcharias*), a small fish with a long, pointed head like a bird's beak, of the *plagiostomos* order, and several *mandi* — a small yellow fish with enormous eyes. The *mandi* had remark-

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able vitality. Seven hours after it had been caught — I had no idea the poor thing was still alive — it gave several leaps in the air, and when I put it in a bucket of water, it shortly began to swim as if nothing had happened.

There were only two or three very small dug-outs on the Araguaya, none of which were capable of carrying more than one or two people. There was no boat there large enough to carry all my men and baggage, had I even at that moment decided to descend that river instead of proceeding west. I took observations for latitude and longitude at Porto Castanho, as well as boiling-point observations with the hypso-metrical apparatus, the latter in order to get the exact elevation, and also to keep a check on my several aneroids, which I used on the journey merely for differential observations.

May 9, 1910. Boiling point, $210^{\circ} 3'$ Fahrenheit. Temperature of the air, 83° Fahrenheit = 1,182 feet above the sea level. By aneroid, 1,190 feet.

My mules having had a good rest, I was making ready to start on May twelfth, when one of my men refused to come any farther. He wished to be paid off and go. So he received his pay and went. He would probably end his existence in that filthy little hamlet, for he would never have the energy to return to Goyaz alone. I was rather glad he had gone, as, a few nights previously, he had fired at me while I was asleep. The bullet had actually made a hole through the canvas of my camp bed. I had fortunately taken the precaution to alter the position of my bed under my tent — a precaution I took every night, after my men had gone to sleep in their hammocks, some distance outside. The man had evidently aimed where he thought my head was resting. As I had turned the bed around, the bullet, fired from the man standing, went just over my ankles, perforating the canvas quite close to them. I naturally came out of my tent to see what was the matter, and saw the man with the rifle in his hand.

INDISCRIMINATE FIRING

"Why did you shoot?" I inquired, as the man, evidently surprised to see me standing before him, ejaculated disconnected words.

"I saw a huge *onça*" (a jaguar) . . . "it was there . . . I saw its two eyes shining like fire . . ."

"Did you kill the *onça*?"

"No, it leapt away."

I advised the man, patting him paternally on the back, not to startle everybody again. If he should see another *onça*, he had better come to me. I seldom missed when I fired at all, as I had been able to show them a few days before. I did not wish my men to behave like so many timid young girls, as I wished to be able to tell people in Europe that Brazilians were brave and noble.

"Firing in such a fashion indiscriminately," I explained to him, "you might have even killed one of your companions! Now go to sleep like a good fellow, and do not fire again!"

I spoke to the rascal in the gentlest of ways, never for one moment letting him suspect that I knew he had intended that bullet to go through my head. Nor did I ever take any of the other men into my confidence. When they asked what the commotion was about, I told them that their companion had fired at a jaguar, and the jaguar had leapt away. There is only one effective weapon you can use with scoundrels. It is the greatest calm and kindness.

The man, hiding his face in his hands, threw himself upon his hammock and began to sob. He sobbed and sobbed and sobbed until the morning, much to the inconvenience of everybody in camp. At sunrise he had been seized with a severe attack of rheumatism, which had contracted a leg badly. It was pitiful to see him walking—but when he was not aware of being looked at, he walked as well as anybody else.

From that day that fellow never dared look me

ACROSS UNKNOWN SOUTH AMERICA

straight in the face. He avoided riding near me on the march, and in camp was sulky and unpleasant, retiring to a distance and declining to work. He was relieved of the functions of cook. The last meal he had produced nearly brought massacre upon him at the hands of the other men.

He received his full pay up to date, without uttering a word of thanks. He duly signed a receipt with his thumb-mark, as he was unable to write. When the troop of horses and mules and his companions left, he never spoke a word of farewell to his companions or animals, or to me. He sat silent and motionless, with his eyes riveted to the ground as if in a trance. Some days later we discovered that he had stolen from our store some forty pounds of coffee and a large quantity of sugar, as well as a number of other articles which had been useful to us.

The sky when we left was overcast, and huge, globular clouds, white and grey, hung in great masses, especially half way up the vault of the sky. The country, after crossing the Araguaya, was remarkably beautiful, from an agricultural point of view: enormous campos or prairies over rich alluvial deposits, with scanty stunted trees upon them. Plenty of buriti palms grew in the lower depressions.

My men suffered intensely from the cold at night, the minimum being 60° Fahrenheit, maximum 92°, in the afternoon of the thirteenth. The temperature had been much lower since we had crossed the great river. The elevation was only 1,250 feet.

Rising slowly over an undulation in the country to 1,300 feet, we began to find igneous rock showing through the surface soil, especially on the higher points.

Lixia (*Nephelium Litchi* Carab), *caraiba*, and the *laranjeira do campo* (*Citrus vulgaris*), were trees to be seen in that region.

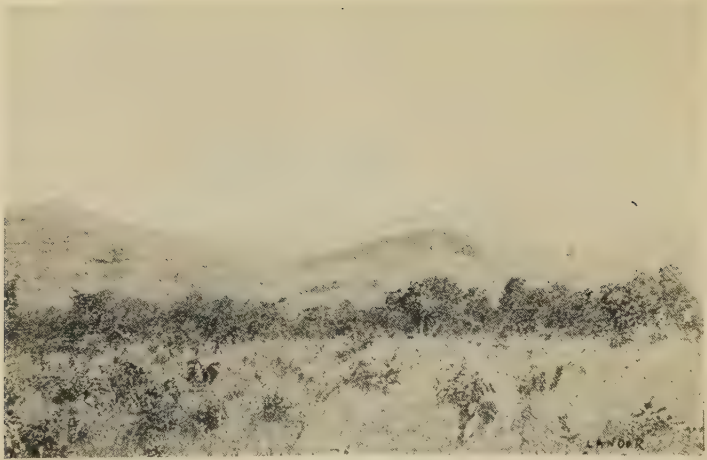
We had wonderfully clear sky in the morning. At



TYPICAL FLAT-TOPPED PLATEAU OF CENTRAL BRAZIL.



ONE NIGHT'S FISHING ON THE ARAGUAYA.



THE PAREDÃOZINHO.



TYPICAL SCENERY OF MATTO GROSSO.

TROUBLESOME INSECTS

noon it became slightly clouded, while in the afternoon one third of the sky was covered. A light breeze blew from the west.

Some twenty-eight kilometres from the Araguaya we came to a small, miserable farmhouse. After a great deal of bargaining, I was able to purchase extra horses. The people had no idea whatever of the value of money, and named sums at first which would have easily purchased the finest horses on the English turf. They descended in time to more reasonable figures.

Our life was rendered miserable all day by the millions of *pium* or gnats that swarmed around us and stung us with incredible fierceness and viciousness. The itching was most trying. Those little brutes left on our skins black marks fully as large as themselves, wherever they stung us. Those marks remained for several weeks, and disappeared only when we perforated them with a needle to let the blood out, or waited long enough for them to become desiccated and the skin re-formed.

Pium is a word of the Tupi and Tupinamba Indians' language. Those tiny insects entered your eyes, leaving behind an odoriferous acid which caused great irritation of the lids. We removed dozens every day from our eyes. Fortunately they were easily extracted. They also dashed into your ears, up your nose, and, whenever you opened it, inside your mouth.

It was well worth going to Matto Grosso to enjoy the lovely moonlight nights, only comparable in their luminous splendour to nights of Central Africa in the middle of the Sahara desert, and to those on the high Tibetan plateau in Asia. The light of the moon was so vivid that one could see almost as well as in the daytime.

Personally, the crisp, cool air (minimum 59° Fahrenheit) made me feel in most excellent health and spirits, but my men, who had putrid constitutions, were a mass of aches and pains. Some cried like children the entire night

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with toothache, moaning and shrieking like lunatics when the pain became acute; others suffered with internal aches, another had cramp in the legs. I must say that Alcides, with all his faults, was the only one who always did his work — not always with common sense, but he did it — and, when ill, never gave exhibitions of pitiful weakness like the others.

Filippe, the negro, who eventually showed himself to be the bravest Brazilian on that expedition, also stood the pain more calmly and with manliness. As I had judged from the first moment I had laid eyes upon them, those were really the only two men who were any good at all. "*Il bon dì si vede dal mattino*" (A fine day is seen in the morning), says an ancient and very true Italian proverb; truer, perhaps, in its philosophy with individuals than with the weather.

Many of my men's complaints vanished with the warmth of the sun: 108° Fahrenheit at one p.m., with a maximum temperature during the day of 85° in the shade.

With the beautiful clear sky and a gentle breeze blowing, it was a real delight to march. Only a slight whitish mist, always in horizontal streaks, was to be noticed near the earth. The sky, although limpid, was never of a deep blue, but merely of a pale cobalt. The dew was heavy during the night and soaked everything, making the baggage, the tents particularly, heavy for the animals to carry. We still kept at an elevation of 1,250 feet, noticing, as we marched on, an isolated range of hills extending from northeast to southwest and showing considerable erosion at its southwesterly terminus. Two conical hills — one a broken cone — stood on the summit of a flat plateau, the entire range, as well as the summit of hills, showing eroded slopes with vertical, wall-like superior portions.

After leaving the stream at the foot of a range 1,450 feet above the sea level, on rising over a low pass I could

LAND OF GREAT VALUE

observe to the northeast of that range great blocks of eruptive rock much perforated, in which were embedded pellets of yellow lava and of red and black baked igneous rock. On examining the northeastern end of the main part of the range, it was apparent that what remained standing before us was merely one half of a circular crater, the other half of which had collapsed or had been blown up by volcanic action. The bottom of the crater was subsequently filled with alluvial deposits, and there was now a grassy plain with a few burity palms. In the valley before us was ideal pasture land, which will some day be of great value.

We crossed two cols (elevation 1,550 feet) with a beautiful plain between. Then we descended into a third lovely valley on the north side of the outer wall of the crater. The grazing was perfect for the animals. Clusters of vigorous, healthy, burity palms stood in great numbers in the centre and at the sides of the valley. This great valley was bounded by two ridges extending in a northerly direction — two spurs, as it were. The rounded, channelled, outer sides of the crater to the north would tend to strengthen the theory that those slopes were formerly a gradual continuation of the present inclined valley. On those slopes of the mountain hardly any vegetation could be noticed, perhaps owing to the fact that hard volcanic rock existed under the thin surface padding of yellowish earth.

The valley was buried in red and grey lapilli and ashes, finely broken up marble cubes, and fragments of other forms of crystallized rock.

As we proceeded from camp Fogasso, the northern slopes of the crater became divided into huge furrows, the vertical upper part of the crater displaying vivid, rich, red tones. The crater was castellated at the summit, like the walls of a fortress.

The geological formation of that portion of the Matto

ACROSS UNKNOWN SOUTH AMERICA

Grosso plateau interested me greatly: Each individual spur, taken separately, showed slopes sometimes abrupt, sometimes well rounded, separated from the next spur of hills by a V-shaped or angular, or else a concave hollow. At the bottom of those hollows one did not find the slopes continuing the line of the crater, but the valley was there absolutely flat and cut the line of the slope sharply. It would almost appear as if a subsidence of the soil had taken place in that particular locality, or else one might speculate whether those abrupt hills had not once been the walls of a subterranean volcanic cauldron, the flat valley, in which we were, having been the bottom of that cauldron. What little rock one found in the river bed in this valley showed signs of having been exposed to intense and prolonged heat, and so did the brilliant red summit of the hill range, which was also of the deep red, typical of hard-baked rock.

The scene which I had before me there in Matto Grosso greatly reminded me of a similar basin I had seen when the great Bandaisan mountain in Japan was blown up by a volcanic explosion and left merely the bottom part of its gigantic internal cauldron with vertical red walls around it. With the exception of scanty and anæmic grass and a few stunted trees, there was hardly any vegetation noticeable. The Fogasso stream, on the bank of which we camped, flowed in an easterly direction into the Araguaya.

The temperature on the plateau was ideal: minimum 63° Fahrenheit during the night; maximum 75°. We were at an elevation of 1,450 feet.

On May fifteenth we were travelling through a valley over which must have once risen the continuation of a range which stood to the north of us. There were deep grooves and corrugations in the valley in a direction from south to north between the two sections of the now interrupted range. There we found soil of red, brown,

STRANGE GEOLOGICAL FORMATION

and yellow tints, or else great stretches of grey volcanic ashes and earth mixed, as well as sharply angular fragments of igneous rock, which showed that they had not travelled there by rolling on the ground or been propelled by water.

After this we passed close to another curious spur of mountains on the east, quite isolated and of a red vertical columnar formation. Its summit was broken up, much more so than that of the plateau-like range to the south of us, which we were following in a parallel line. The highest point of that range, to the south, was wooded, and so were the two conical-topped hills which towered over it. The strata where exposed showed a slight dip to the north. We crossed the range by two low cols at elevations of 1,550 feet and 1,560 feet respectively. On the summit and even lower upon the sides of those cols we found huge boulders of eruptive rock, highly ferruginous. Globular lumps, big and small, of spattered, smooth-surfaced, yellow lava were to be found in myriads; also many spherical pellets of ferruginous, highly baked rock, with innumerable holes produced while in a state of ebullition. Some of the ferruginous rocks had pellets of yellow lava firmly embedded in them, which had evidently penetrated, while liquid, into the hollows of the ferruginous rock, which was already in a semi-solid, or perhaps solidified, condition. At any rate, when it happened, the ferruginous rock was already harder than the lava.

While I was studying attentively the geological conditions of that region, the sky suddenly became as black as ink to the south, and a heavy shower, which lasted half an hour, drenched us all to the marrow of our bones. Then it cleared up, and the sun, supplemented by our natural heat, dried our clothes upon us as we went on.

CHAPTER XII

GEOLOGICAL SPECULATION — BEAUTIFUL PASTURE-LAND

THE stars were of extraordinary brilliancy at night; so brilliant that one could see quite well enough by their light to get about. The atmosphere being extremely clear, they appeared of immense size, the planets shining with dazzling, changing colours, which would have filled even the most profane with reverence for their splendour.

I drew the attention of my men to the wonderful sight.

“They are stars!” they replied contemptuously; “Have you never seen stars before?”

It was indeed difficult to enter into conversation on any subject with them without having an ardent desire to strangle the lot, they were so ignorantly offensive. I was thankful I had the sense always to go about unarmed, or I am certain some of them would have paid somewhat dearly for their impertinence. I was glad, too, that I never felt the weight of loneliness, as days and days would go by without my saying a word to them, barring perhaps a shout in camp to bring my breakfast, lunch, or dinner.

What was even worse than entering into conversation with them was to listen—one could not help it, they shouted so loudly all the time—to the conversation among themselves. We will not refer to the choice language they used, so inexplicably sacrilegious and indecorous that it would have set on edge the teeth of the

THE *FEIJAO*

coarsest specimens of humanity; but the subject — I use the singular, mark you, for alas! there was only one, discussed in all its phases perhaps, but only one single subject — assassination. The accounts of different murders, in some of which the men boasted they had taken part, were nightly repeated in their minutest details to the assembled crowd, myself excluded, sitting around the fire, while the *feijao* (beans) so loved by them were being stewed for hours and hours in a cauldron.

There was one story of a murder of which one of the men was particularly proud, in which he reproduced the facial expression as well as the smothered shrieks of the horrified victim. He gave a vivid description of how the blood squirted out like a fountain from the jugular vein of the throat as it was being severed. That story, most graphically narrated, I admit, had taken the fancy of that cruel crowd. Almost every evening, during the entire time those men were with me, many long months, I heard that story repeated amid roars of laughter from the company. Murder, when applied to others, was evidently for them a great joke!

Inconsiderate to a degree, they would get up and sing at the top of their voices in the middle of the night, and keep everybody awake while the *feijao* was stewing. It took hours and hours before those awful black beans had boiled sufficiently to be edible, and the man who acted as cook had to sit up the whole night to stir them up and watch them. Yes, the position of cook for the camp was not an enviable one, for it meant marching all day and sitting up all night to prepare the *feijao* for the following day. Yet the love they had for their *feijao* — I never ate the beastly stuff myself — was so great that those lazy devils, who could not be induced on any account to do other work, did not mind at all spending sleepless nights in watching over the steaming cauldron. With the *feijao* were placed in the pot large pieces of

ACROSS UNKNOWN SOUTH AMERICA

toucinho (lard). We carried quantities of *feijao*, for without *feijao* you cannot induce a Brazilian to do anything or go anywhere. Of the two he would rather sacrifice his life than lose his daily *feijao*.

It requires great ability, I believe, to cook *feijao* properly. I noticed that all my men in a body were ever superintending its preparation. When the cook in the early hours of the morning happened to let the fire go down, or in his drowsiness was not stirring it properly, there were angry shouts from the other men, who, every time they opened one eye in their sleep, invariably gazed towards the beloved cooking-pot.

We came to a second range parallel with the one described before and extending from northeast to southwest. Again a vertical natural wall was noticeable to the east. This range was subdivided into many sections, almost all of the same size and shape. The end section to the northeast, which made an exception, was about three and a half times the length of any of the others. I observed some deep vertical vents such as are to be seen frequently in the sections of volcanoes that have been partly blown up. These vents were particularly numerous in the northeasterly block, where broad corrugations and some narrow ones—ten in all—were also to be seen.

Two alternatives could explain the present configuration of that region. There had been either a great volcanic explosion or else a sudden subsidence. Personally I was inclined to favour the first hypothesis. I shall explain why. First because the great fissures between the various huge blocks and the grooves carved in those rocks would then at once explain themselves: caused naturally by the violent shock. They had apparently been enlarged in the course of time by erosion of water and wind, and possibly by the friction of the *débris* of the masses of rock settling down, when the stratum was severed. The quantity of *débris* of shattered rock

GEOLOGICAL SPECULATION

minutely broken into cubes and other angular forms would suggest that some great shock had occurred. Then the usual yellow pellets of polished lava, either globular or pear-shaped, or like an elongated oval ending in a point and well rounded at the other end, would also indicate that these missiles had been flying great distances through the air in a molten state before they had actually dropped. In fact, the flight was so long as absolutely to cool and solidify them before they fell, unless they had landed in cold water, for they had retained their original form, instead of getting flattened at the heavier end, as would be expected had the lava reached the ground in a half-soft state. Large blocks of lava, which naturally took a longer time to cool and a shorter time to reach the earth after their flight through the atmosphere, had, in fact, become flattened on the lower side, where they struck the ground. Others of a composite globular form had invariably been flattened into a slight curve on the side where they had come in contact with the soil.

Ovoid rocks as large as a loaf of bread and composed of compressed cinders were to be seen, which, when easily split open, showed a band of slightly ferruginous matter, very brittle, in a crystallized condition. In the centre of these rocks were invariably found beautiful crystals of great limpidity, easily separated from one another by a slight pressure of the fingers.

Erosion had evidently since played great part in the present appearance of the country, but to my mind, directly above what is now a valley, there existed at one time a high range of mountains, which was in those days the great dividing line of the waters flowing south and north.

One might, of course, also argue that what are the mountains now have been pushed up from underneath the ground into their present position, but local conditions do not tend to encourage this theory.

ACROSS UNKNOWN SOUTH AMERICA

The strata of red, baked rock in the existing mountain-side were almost absolutely horizontal, with merely a slight dip to the north. In the northern end of the range the rock showing through the vegetation was white, as if it had been subjected to baking. The western aspect of the first range showed also a vertical summit of red rock, with a sloping spur extending to the west.

We camped that night on the river Prata, which flowed south. Elevation 1,300 feet. Maximum temperature 85° Fahrenheit, minimum 63½° Fahrenheit.

The formation of the clouds was always interesting. The long, horizontal streaks across the sky, which were daily noticeable, took a form that day not unlike the vertebræ of an immense snake, whereas the higher clouds of transparent mist in filaments looked exactly like a huge spider's web.

We established our camp under a tall, handsome, slender, *Xinghi* tree, the triangular fruit of which, with a light brown, hard skin, was deadly poisonous if eaten. Alcides told me that in Minas Geraes it was much used in the manufacture of soap. This tree was extremely neat-looking, with its clean, sinuous branches and its pretty, light green, healthy leaves, of an elongated oval shape.

My men had insisted on bringing dogs away with us for safety in case of attack by Indians. They had in fact procured three, I would not care to say how, before our departure from the Goyaz Province. Those dogs were just as faithless and lazy and worthless as the people. They followed us because they got plenty of food, otherwise they had no affection for anybody; and, far from giving an alarm when any person or any animal approached the camp, they were quite unmoved by anything that happened around them during the day or night, except at meal-times. A handsome *onça* (jaguar) leapt close to camp, and on perceiving us bounded gracefully

GOOD WATER

away; the dogs remained fast asleep with their noses resting on their respective extended fore-paws. Another day during the march a *veado* (*Cervus elaphus*), a deer, sprang in his flight clean over one of the dogs without the dog even noticing him! Game was plentiful in that part of the country, and the animals were so unaccustomed to see people that one could get quite near them.

My men went after game in the morning, and we did not start very early, in fact not until 10.30 a.m. It was amazing to see the amount of good water that was to be found on the plateau. We crossed a streamlet flowing south (elevation 1,300 feet), and shortly afterwards, upon gently inclined land, we crossed another stream, also flowing south.

We were travelling due west along the foot of a curious range which stood to our north and of another of similar characteristics to the south. It seemed quite possible, in fact, even probable, that the two ranges were formerly only one, which had split, and that we were travelling inside the partially-filled-up fissure between the two divisions. The sky-line of the two ranges matched exactly on both sides: first a long hump, then two smaller humps, after that a more even and continuous line.

On reaching an elevation of 1,500 feet we were confronted with a splendid view of a flat plateau to the west. By a steep descent we went down 300 feet to a river (elevation 1,200 feet above the sea level) in a hollow, reached by going through dense, tall grass and thick vegetation. A humble wooden cross by the stream marked the spot where a Brazilian had been murdered by Indians.

Interesting flows and domes of lava were to be seen near the stream, after which our marching that day was mostly up and down campos with magnificent grazing, the general slope of which was from north to south. At an elevation of 1,400 feet, on looking back, we

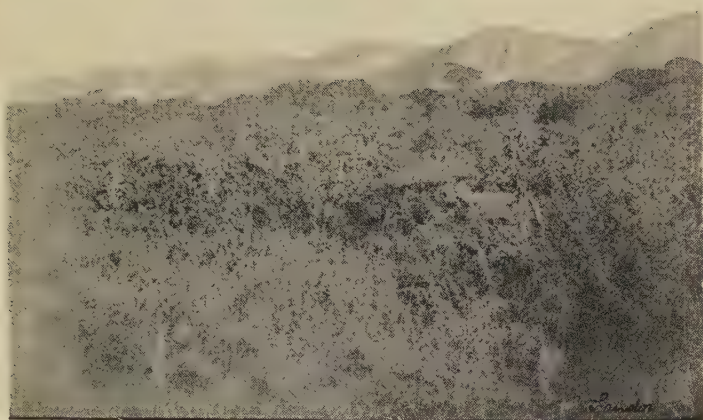
ACROSS UNKNOWN SOUTH AMERICA

had a general view of the two ranges which had become separated.

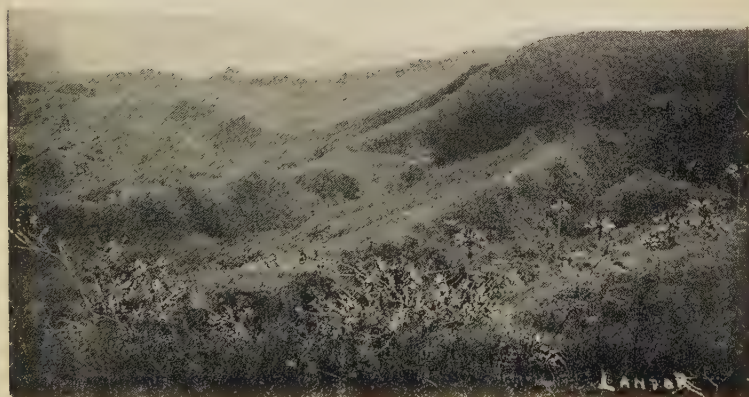
On one side of the range, a sloping back was noticeable, whereas on the opposite side were almost vertical sides, much grooved, with a terrace about two thirds up the total elevation, except at the western end, where the terrace was instead exactly half way up, with a minor terrace near the summit.

We met and crossed another streamlet, and then rose on our route to 1,550 feet, from where another beautiful view of the plateau to the southwest could be obtained, a low hill range with a higher peak in front of it, and the immense green campos at a slanting angle. Another fine panoramic view of the divided ranges was also before us, although from our particular point of vantage it was slightly more difficult to reconstruct their former appearance in one's imagination than from the centre of the valley we had crossed, although even from our point the fact was apparent after a little study.

On proceeding down to the river, we met some flows of red lava and, upon the top of nearly every undulation, boulders of black eruptive rock showed through, highly ferruginous, as well as much lava in pellets. Débris of baked red and black rock were to be found in quantities down the slopes and at the bottom of those undulations, carried there evidently by water. In one or two places, such as near the river at Ponte Keimada, I smashed some of the larger boulders of yellow lava. Here is what I found inside: Under an outer coating of lava an inch thick there was a layer of solidified cinders. Under that lay a thin layer of lava, then again yet another layer of grey ashes, then lava again. This would indicate that those boulders had gradually reached their present shape partly in revolutions through the air thick with cinders, partly by rolling down or along intermittent stretches of molten lava and cinders during a great eruption, or per-



VOLCANIC SCENERY OF MATTO GROSSO.
Chapada in foreground.



PECULIAR FORMATION OF CENTRAL PLATEAU.



CURIOUS DOMES OF LAVA.
With upper stratum of earth, sand and ashes.



GREAT UNDULATING CAMPOS OF MATTO GROSSO.

A CHANGE OF SCENERY

haps during several successive eruptions. Personally, I think that it was during various periods of one eruption before the lava had cooled, so that in its sticky state it would easily collect the ashes round it, which it would certainly not do in its polished, solidified state.

When we had passed beyond the western end of the two parallel ranges, a great change was noticeable in the appearance of the country we were crossing. We missed the long, sweeping, uninterrupted lines of the scenery, and had before our eyes a confused surface of bosses, mounds, and short undulations, with thick, luxuriant vegetation upon them, which prevented my studying carefully their geological formation. The soil, of a rich red colour, showed every indication of being extremely fertile in that particular climate.

From the point where we stood, one could well judge the effects of the great volcanic explosion on the back of the range — the one to our left — where a long line of buttresses had formed, as if on that side a subsidence on a large scale had also taken place. It was in any case curious to notice that at the two termini east and west of the two parallel ranges white rock in columnar form was exposed in both ranges in corresponding sites.

The slope noticeable on the north side of the southern range could be explained by the tilting of the strata where the separation took place. The angle of the strata clearly demonstrated this fact.

Millions of mosquitoes and *piums*, *carrapatinhos*, and *carrapatos* made life unbearable during both the day and night. We never had a moment's respite. The gnats, too, in thick swarms around us, were a constant worry; we were busy all day removing them from our eyes and ears. They stung us all over most mercilessly. I was making a botanical collection, which contained not only specimens of the leaves of all the trees we met with, but also of minor plants and various kinds of grass. This

ACROSS UNKNOWN SOUTH AMERICA

involved getting off my mule many times a day. Whenever I put my feet on the ground or touched a blade of grass, I well knew what was in store for me. At once I became literally covered with *carrapatinhos*, and had to scratch myself so violently that nothing short of digging my nails into my skin seemed to relieve the irritation — and that, mind you, only momentarily. One had to bear it, and wait until one got to camp in the evening before one could disinfect oneself all over. In this world one never gets much credit for anything, but I do think that few men under those circumstances would have gone on, as I did, collecting botanical specimens for no reward whatever except my own pleasure, if pleasure it can be called.

Again we noticed that day wonderful effects of clouds in filaments, one group stretching along the sky in an arc from north to east like the dorsal bone and ribs of an immense fish.

We camped on the bank of a stream (elevation 1,050 feet) flowing northeast, which was, I think, the same stream we had met in the morning, and which had described a big turn.

My men amused me with their fears. Even when in camp they never left their rifles for a moment. When they went only a few yards away, either to fetch water or bring back a mule, they invariably took all their weapons with them — carbines, automatic pistols, and daggers.

In order to collect specimens and examine the country, I frequently strayed away alone for long distances from camp, sometimes for two or three hours at a time, always absolutely unarmed. My men began to be thoroughly frightened at the immunity I possessed from attacks of wild beasts and Indians. Although I told them that wild beasts never attacked human beings unless attacked first, and that there were no Indians about, my men would not believe me. They maintained that I must have some

A SPECIAL SECRET

special secret of my own which brought me back alive, and that I must be even bullet-proof. They could never be induced to go alone, even when armed, for more than a few metres from camp.

We were having cool nights. Minimum 59° Fahrenheit, maximum 80° Fahrenheit — on May seventeenth. A mackerel sky of the prettiest design was overhead, like a lovely mosaic of white and blue porcelain, while a band of clear blue encircled us all around above the horizon line.

Across a forest we continued our journey, rising some 300 feet to 1,350 feet above the sea level, where we again found campos and forest alternately upon deep masses of fine red sand, or else great expanses of grey and black volcanic cinders intermixed in patches. On reaching the highest elevation we actually went over six kilometres of volcanic sand and ashes, and in one place traversed a patch of shattered *débris* with cutting edges of eruptive rock, and brilliant red or deep black pebbles. Then again we saw masses of the usual ferruginous, much-perforated rocks, many so absolutely spherical as to resemble cannon-balls.

To the west we could see before us lovely green undulations — campos — with a curious hump in the centre, that looked as though due to subterranean pressure. In the distance was visible another of those long, flat-topped plateaus typical of Brazil, with a headland which, owing, it seemed, chiefly to erosion, had become separated from the main range. It resembled and was parallel with the second range of the split mountains we had just left. Some nine kilometres from our last camp we encountered the river Das Corgo, flowing south (elevation 1,150 feet) over a bed formed by an impressive great flow of solidified red lava covered in some places by deposits of bright red earth. Beyond the river we found ourselves again upon yellow sand and ashes.

ACROSS UNKNOWN SOUTH AMERICA

Beneath a cirro-cumulus — or mackerel sky — wonderfully beautiful because of its perfection of design, we were gradually rising over the domed elevation we had previously observed, upon which we found masses of tiny pebbles — what are known to geologists by the Italian name of “puzzolana” or *scoriæ* reduced to a granular condition. Farther on, travelling over other undulations, we sank into thick deposits of grey and yellow volcanic *scoriæ*, such as fine sand, cinders, and lapilli. At the highest point (elevation 1,270 feet) we travelled over deep sediments of sand and ashes mixed together. All those undulations, as a matter of fact, were above great buried flows of red lava, which were invariably exposed to sight in the depressions, particularly in the beds of rivers.

Being a great lover of good water, to my mind the elixir of life, the great secret of health and strength, I was always enraptured by the deliciousness of the water in the streams we met. It was so crystalline and limpid that one could not resist the temptation to drink it, even when not thirsty. I always carried slung to my saddle an enamelled tin cup attached to a string, so as to be able to procure myself a drink at all the streams without getting off my mount.

Twelve kilometres from our last camp we came to a watercourse flowing into a big stream at the bottom of the valley. Its bed was in overlapping terraces of polished red lava.

The green country before us, in great sweeping undulations, reminded one much, in its regularity, of the great waves of the ocean — what sailors call “long seas.” Where the stream had cut through and left the underlying dome of lava exposed, one could easily judge of the thick deposits of sand, ashes, and pulverized rock which formed the strata above it.

We travelled over more red volcanic sand for some

MAGNIFICENT GRAZING LAND

four kilometres, rising to 1,400 feet, on which elevation was thick *matto*, or stunted, much entangled forest. Then we emerged again into glorious open country, marching over a stratum eight feet thick of whitish tufa and ashes, this stratum lying immediately above one of red volcanic earth. The strata were easily measurable where rivulets had cut deep grooves in the softer superficial strata and had reached the foundation layer of lava.

The campos seemed to grow more and more beautiful as we went west. What magnificent grazing land! One could imagine on it millions and millions of happy, fat cattle; but no, not one was to be seen anywhere. What a pity to see such wonderful country go to waste! There was everything there, barring, perhaps, easy transport, to make the happiness and fortune of thousands upon thousands of farmers — excellent grazing, fertile soil, good healthy climate, and delicious and plentiful water — but the country was absolutely deserted.

For miles the beautiful prairies extended, especially to the southwest, where in the distant background loomed a high, flat-topped tableland, interrupted by two deep cuts in its extensive, monotonous sky-line. Those cuts were near its southern end. To the south stood a long range of wooded hills, also with an absolutely flat sky-line. We ourselves were not higher than 1,400 feet above the sea level. My animals stumbled along over a region of much-broken-up *débris*; then again travelling was easier, although heavy, over tufa, sand, and ashes. On descending to a stream, 1,200 feet above sea level, we slipped terribly on the steep argillaceous slope, and the animals had great difficulty in climbing up on the opposite side, where we made our camp.

The streamlet flowed east into a larger stream, which we also crossed, and which flowed southwest.

It seemed to be getting colder at night as we went

ACROSS UNKNOWN SOUTH AMERICA

westward (May 18, minimum 57° Fahrenheit), whereas during the day the temperature was hot — maximum 97° Fahrenheit. As early as 9 a.m. the thermometer already registered 85° in the shade, and there was not a breath of wind. The elevation was 1,150 feet. The sky was in streaky, horizontal clouds to the east, and thin, misty clouds to the south — cirro-stratus.

One of my horses having strayed away a long distance, we did not leave that camp until the afternoon, after the animal had been recovered. We rose quickly over the usual red volcanic sand, held down in its place by the vegetation, rather anæmic at that particular spot. Higher up we again sank in the white and yellow ashes, with occasional zones covered by small, angular, black-baked débris.

Ants seemed to flourish happily in that region, for the ant-heaps were innumerable and of great size, several with towers about six feet in height, resembling miniature mediæval castles.

Having risen — all the time over grey and white ashes — to 1,420 feet, we found ourselves again upon open campos, with a splendid view of the flat-topped range we had already seen to the north and of another to the south. At the angle where the northern range changed its direction slightly, there stood a high prominence of peculiar appearance. The range extended west, where it ended, into a broken cone, quite separated by erosion from the main range, as I have already stated. All along the range in the section between the prominence at the angle and the terminal cone could be noticed three distinct level terraces and several intermediate ones, not yet well defined nor continuous along the whole face of the range. About half way along its length, a semi-cylindrical vertical cut was a striking feature, and appeared from a distance to be the remains of an extinct crater. It may be noted that where that crater was, the range was higher than else-

RIVER CORGO FUNDO

where. Its summit, with an undulating sky-line, lay to the west of it, no doubt formed by erupted matter. Other great vertical furrows were noticeable not far from the crater and to the west of it.

The scenery was getting stranger and stranger every day. We began to notice solitary domes and cones in the landscape. That day, in fact, beyond the great campos, we had before us a curious, little, well-rounded dome, standing up by itself upon an absolutely flat surface, at a considerable distance from the flat tableland which stood on one side, and of which formerly it evidently made part. Higher mountains, somewhat nearer to us, were on the southwest.

We had reached the River Corgo Fundo (elevation 1,250 feet), along the banks of which the laminae of red-baked rock could be observed with thin white layers between. Above was a lovely green pasture with a tuft of deep green trees, which looked exactly like a bit of a well-kept English park. We mounted up again to 1,430 feet, then went down another descent into a large plain with campos, upon which grew merely a few stunted trees. We were still travelling over deep deposits of sand.

The range to the north of us extended, to be accurate, from northeast to southwest, and at its southwesterly end possessed a dome not dissimilar to the one already described on our previous day's march. This one was perhaps more rounded and not quite so tall. It rose above the plateau in two well-defined terraces, especially on the northeast side, but was slightly worn and smoothed to the southwest. On the terminal mound, clearly separated from the range by erosion, seven distinct terraces could be counted, with some less defined, intermediate ones.

In the bed of another stream flowing south — it was impossible to ascertain the names of these streamlets, for there was no one to tell, and none were marked on existing

ACROSS UNKNOWN SOUTH AMERICA

maps — another great flow of red lava was visible. This stream flowed into the Rio das Garças or Barreiros, only 500 metres away: an important watercourse, throwing itself eastward into the Rio das Mortes, one of the great tributaries of the upper Araguaya River.

CHAPTER XIII

THE RIVER BARREIROS — A COUNTRY OF TABLELANDS

THE Rio Barreiros was about 100 metres wide. It was reached through a thick belt, 100 metres in width, of trees and bamboos of large diameter, which lined both its banks. The river flowed swiftly where we crossed it, over a bed of lava and baked rock, red and black, with huge treacherous pits and holes which rendered the job of crossing the stream dangerous for our animals. There were rapids lower down in the terraced mass of rock forming the river bottom. The rock, worn smooth by the water, was extremely slippery. It was only after we had all undressed and taken the baggage safely across on our heads—the river being too deep for the loads to remain on the saddles—that we successfully drove the animals over to the opposite bank.

On the banks I collected some specimens of the laminated red rock, which had no great crushing resistance when dry. It could be easily powdered under comparatively light pressure, and scratched with no difficulty with one's nails. It was of various densities of red tones, according to the amount of baking it had undergone. The superimposed red strata had a dip northward in some localities. The rock was much fissured, and had either gone through excessive contraction in cooling, or else perhaps had been shattered by some earthly commotion, such as must have occurred often in that region in ages gone by; for, if not, how could one account for finding scattered blocks of this red rock resting upon the surface of great

ACROSS UNKNOWN SOUTH AMERICA

stretches — sometimes for 20 or 30 kilometres — of uninterrupted sand or ashes which covered such great expanses of that country?

In the valleys, near water, burity palms were numerous.

Overhead the sky was always interesting. The days nearly invariably began with a clear, speckless sky, but, mind you, never of quite so deep a blue as the sky of Italy or Egypt. The sky of Central Brazil was always of a whitish cobalt blue. That morning, an exception to prove the rule, we had awakened to a thick mist around us, which enveloped and damped everything. No sooner did the sun rise than the mist was quickly dispelled. In the late morning, about ten o'clock, clouds began to form high in the sky — not along the horizon, as is generally the case in most countries — and grew in intensity and size during the afternoon. Nearly every day at about sunset a peculiar flimsy, almost transparent, streak of mist stretched right across the sky from east to west, either in the shape of a curved line, or, as we had observed as recently as the day before, resembling with its side filaments a gigantic feather or the skeleton of a fish.

In the State of Goyaz, it may be remembered, we had a more beautiful and complete effect at sunset of many radiating lines, starting from the east and joining again in the west, but here we had merely one single streak, dividing the sky in two. When the sun had long disappeared below the horizon, that streak high up in the sky was still lighted by its rays, becoming first golden, then red. The effect was quite weird.

My men during the night went on another fishing expedition, but with no luck, partly due to the infamy of our dogs. They used as bait for their large hooks *toucinho*, or pork fat, of which they had started out provided with a huge piece. They walked a good distance from camp to find a suitable spot. Unfortunately,

DANGEROUS EXPERIMENTS

while they were there, the dogs ate up all the *toucinho*, and the result was that the men had to return disappointed. There was plenty of game, especially wild pig and *veado* (deer).

Alcides had a smattering of botany, which was a great danger to the company. He knew, he thought, the uses, medicinal or otherwise, of all plants, herbs, and fruit, wild or not wild. This, in addition to the greediness of the men, who, although actually gorged with food, were always willing to devour anything else they found, led once or twice, as we shall see, to the poisoning of himself and his companions so dangerously as not only to cause terrible internal pains, but to bring them all actually to death's door.

I never got poisoned myself, as I generally took good care to watch the effects of those experiments upon my men first. Then also, in my many years of exploration, I had learnt only too well to beware of even the most seductive tropical plants and fruit. Notwithstanding all this, Alcides was really wonderful at turning out pleasant-tasting beverages from the stewed bark or leaves of various trees, and of these decoctions, in which additional quantities of sugar played an important part, my men and myself drank gallons upon gallons. Many of those drinks had powerful astringent qualities and had severe effects upon the bladder, but some were indeed quite good and innocuous.

During the night I observed a most perfect lunar halo, the circle, close to the moon, displaying a curious, yellowish red, outer fringe.

Since leaving the Araguaya, we had been bothered a good deal nightly by the heavy dew, which absolutely soaked everything, made all our rifles and axes and iron implements rusty, and the tents and saddles and baggage considerably heavier for the animals to carry, owing to the moisture they had absorbed. In the early morning

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we began to get thick cold mist, and it was about that time that the minimum temperature was usually registered — 58° Fahrenheit that particular night, May nineteenth. We were at quite a low elevation, merely 1,100 feet. When we started in the morning, we found more sand and volcanic débris over ridges some 100 feet or so above the level of the river. A torrent, 15 metres wide, flowing swiftly west-southwest on a red lava bed, was crossed, the mules slipping terribly on the polished rock. More ashes and sand were found as we ascended to an elevation of 1,200 feet, from which height we discerned a much-terraced headland to the east and two streams meeting and flowing south where we eventually crossed them. One of those watercourses descended in cascades over laminated successive flows of lava, between which thin layers of white crystallization could be seen.

Slightly higher, at 1,250 feet, we sank again in yellow and grey ashes.

Across campos we reached another foaming torrent, flowing as usual over a lava bed, but this time in a northwesterly instead of in a southerly direction. That day we met with many watercourses. Having risen to 1,450 feet, we soon after found another streamlet (elevation 1,230 feet). Again a red lava-flow was exposed in its bed and showed heavy upper deposits of grey ashes, with above them a thick layer of yellow-ochre sand (1,300 feet).

The distances on the journey were measured by a watch, the speed of the animals at the time being naturally taken into consideration. It was not possible to use the usual bicycle wheel with a meter attached, which is used with so much success in the Arctic regions or in countries where travelling more or less in a straight line and on a level surface is possible.

Another limpid stream flowing southwest (elevation 1,200 feet) was reached, then more deep sand and ashes.

A WARM STREAM

After that we came to a thick growth of bamboos and brush on reaching the banks of a streamlet winding its way north.

Travelling up and down, all day and day after day, over those undulations became tedious work; red sand, whitish sand, grey ashes, all the time.

On the west side, on descending the last prominence, we at last came to a slight variation in the geological composition of the country. After more white sand and ashes had been passed, we came upon great stretches of greenish grey granite, exposed in huge domes and much striated, with parallel grooves on its surface so deep that they almost looked as if they had been incised by a sharp tool. These grooves were, nevertheless, naturally caused by the sharp friction of sand and water, I think, and also by sand blown over those rocks with terrific force by winds of inconceivable vigour. All the way down our descent we travelled over that striated rock. It had become exposed to the air, but once must have been buried under sand and ashes, like all the rest of that region. Curious vertical cracks were to be noticed in several places, with ramifications from a common centre, evidently caused by the concussion of some huge weight which had fallen from above, perhaps a huge boulder shot out by volcanic action, which had then rolled farther down the incline.

The terminal side of the curious range we had on our right appeared not unlike a fortress, with its vertical walls standing upon a slanting bastion.

At the bottom (elevation 1,200 feet) of the great dome of granite we had travelled upon, we crossed a stream flowing southwest, the water of which was quite warm. The high temperature was due, I think, to the heat absorbed by the rock exposed to the sun and communicated to the water flowing over it, rather than to a thermal origin.

ACROSS UNKNOWN SOUTH AMERICA

Continuing our journey, we found to the south a great hollow basin in the southwestern end of the range, with two hillocks between the range itself and the flat boundary plateau to the south.

The highest point of the hill on which we travelled was 1,450 feet above the sea level. Every metre we travelled westward became more strangely interesting. We were now upon a conglomerate of bespattered lava-drops, encased in a coating of solidified ashes. When we reached the stream, we had to go through a dark tunnel of dense vegetation, great ferns, giant palms, creepers with their abundant foliage, and tall trees festooned with liane. Having crossed this dark vegetable passage, we emerged once more into lovely open campos.

Great, lumpy, globular, woolly clouds faced us in the sky to the west. Horizontal, intermittent, white layers were close to the horizon to the east, then three parallel lines of feathery mist to the northwest. In quantity of clouds the sky that day would meteorologically be described as C 4 — which means that four tenths of the sky vault was covered.

One could not help being struck in Central Brazil by the almost absolute immobility of the clouds. One seldom experienced a strong wind, contrary to what must have taken place there in ages gone by, when that country must have been the very home of terrific air-currents and disturbances on a scale beyond all conception. It was only occasionally that a light breeze, merely in gusts of a few seconds, would refresh one's ears and eyes as one marched on. What was more remarkable still was the sudden change of direction of those spasmodic gusts of wind when they did come.

From a river (elevation 1,250 feet) we proceeded over undulations to 1,550 feet. There we were treated to an extensive and beautiful view to the west, southwest, and northwest. The elevated sky-line formed by the plateau

FILIPPE, THE NEGRO

and mountains was quite straight, barring three much eroded mountains standing quite isolated and at a great distance from one another.

One of these solitary elevations was to the southwest; another, the castle-like mountain of great height we had already observed, stood due west. Then came the long, flat line of the plateau, with but a gentle convexity at each end. The plateau, dressed in thick forest, stood in the middle distance to the west-southwest. Campos of great beauty were prominent on its slopes and in the two hollows in the immediate vicinity.

As we wound our way forward, we found masses of ferruginous black rock, black *débris*, and beautiful crystals.

The silence of that wonderful landscape was impressive. The tinkling of my mules' neck-bells was the only cheering sound breaking that monotonous solitude, except perhaps the occasional harsh voices of my men, urging on the animals with some unrepeatable oath or other.

Filippe, the negro—to be distinguished from the other Filippi in my employ, a mulatto—was mounted on one of my best mules. He carried a regular armoury on his back and round his waist, for not only did he carry his own rifle but also mine, besides a pistol and two large knives. He rode along, slashing with a long whip now at one mule then at another. Occasionally he treated us to some of his improvised melodies, not at all bad and quite harmonious, although one got rather tired of the incessant repetitions. Philippe was a pure negro, born in Brazil from ex-slaves. He had never been in Africa. His songs interested me, for although much influenced naturally by modern Brazilian and foreign airs he had heard at Araguary, still, when he forgot himself and his surroundings, he would relapse unconsciously into the ululations and plaintive notes and rhythm typical of his

ACROSS UNKNOWN SOUTH AMERICA

ancestral land in Central Africa — that of the Banda tribe, which I happened to have visited some years before. I identified him easily by his features, as well as by his music and other characteristics.

Filippe did not remember his father and mother, nor had he known any other relatives. He had no idea to what tribe he had belonged, he did not know any African language, and he had never to his remembrance knowingly heard African music. It was remarkable under those circumstances that the Central African characteristics should recur unconsciously in Philippe's music. It showed me that one is born with or without certain racial musical proclivities, dictated by the heart and brain. They cannot be eradicated for many generations, no matter what the place of birth may be or the different surroundings in which the individual may find himself, or the influences which may affect him even early in life.

Brazil was certainly a great country for tablelands. As we came out again into the open, another great plateau, ending with a spur not unlike the ram of a battleship, loomed in the foreground to the south. Yet another plateau of a beautiful pure cobalt, also with another gigantic ram, appeared behind the first, in continuation of the two separated plateaux we have already examined. It was separated from these by a deep cut — a regular cañon — several miles wide, and with sides so sharply defined that it looked like the artificial work of an immense canal.

Great campos lay before us in the near foreground, from our high point of vantage (elevation 1,550 feet). We were still travelling on a surface of volcanic débris, yellow ashes, and sand, forming a mere cap over all those hills, the foundation of which was simply a succession of giant domes of lava.

Northwest we still had the almost flat sky-line of a plateau rising slightly in two well-defined steps or terraces

THE RIVER BARREIROS

to a greater height in its northern part. What most attracted me that day was the delightful view of the Barreiros valley spreading before us — a view of truly extraordinary grandeur.

We rapidly descended, leaving to our left the Indian colony of Aracy. Great granitic and lava slabs, much striated, were seen on our way down to the river (elevation 1,200 feet). The stream was 50 metres wide, and flowed south where we crossed it. There was a handsome white sand beach on the left bank of the river. On the western, or right bank, stood great volcanic cliffs of boiled and broiled rock, interesting for the violent contortions they had undergone during the processes of ebullition, which showed plainly in their present solidified form.

The river bed itself was one of the usual lava-flows, with huge globular lumps and knots, but all in a solid, uninterrupted mass.

We waded chest-deep across the stream, conveyed our baggage and mules to the opposite side, and then we all enjoyed a bath with plenty of lathering soap in the deliciously refreshing waters of the Rio Barreiros.

The river Barreiros, which had its birth in the Serra Furnas Corros, to the southwest, entered the Rio das Garças — there 100 metres wide — a short distance from where we crossed it. The latter river, by far the larger of the two and of a very circuitous course, flowed in a southeasterly direction into the Araguaya. The Rio das Garças, which also had its origin in the Furnas Corros Mountains, had almost a parallel course with the upper Barreiros from southwest to northeast, but on meeting the Barreiros suddenly swung round at a sharp angle towards the southeast, which direction it more or less followed, until it entered the Araguaya.

We made our camp on the right bank of the Barreiros River. My men were in a great state of mind when I told them that perhaps on this river we might find some

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Indians. The cautious way in which they remained in camp as quiet as lambs amused me. I noticed the care with which they cleaned their rifles and replenished their magazines with cartridges. I assured them that there was no danger—in fact, that quite close to this place we should find one of the Salesian colonies.

CHAPTER XIV

THE BORORO INDIANS

WHILE I was reassuring my men, an Indian appeared, bow and arrows in hand. He stood motionless, looking at us. My men, who had not noticed his coming, were terrified when they turned round and saw him.

The Indian was a strikingly picturesque figure, with straight, sinewy arms and legs of wonderfully perfect anatomical modelling, well-shaped feet — but not small — and hands. He was not burdened with clothing; in fact, he wore nothing at all, barring a small belt round his waist and a fibre amulet on each arm.

The Indian deposited his bow and arrows against a tree, when some other Indians arrived. He stood there as straight and as still as a bronze statue, his head inclined slightly forward in order to screen his searching eagle eyes from the light by the shade of his protruding brow. He folded his arms in a peculiar manner. His left hand was inserted flat under the right arm, the right hand fully spread flat upon his abdomen.

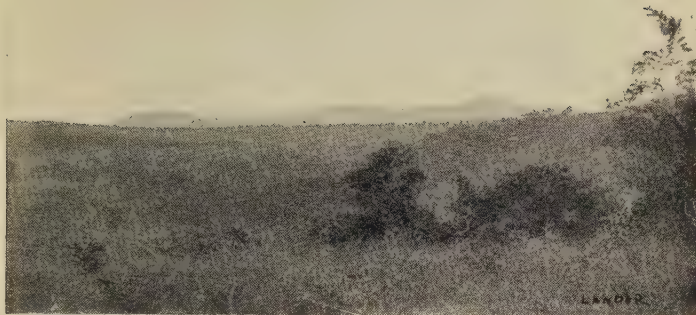
The first thing I did was to take a snapshot of him before he moved. Then I proceeded to the interesting study of his features. They were indeed a great revelation to me. One single glance at him and his comrades persuaded me that a theory I had long cherished about the aboriginal population of the South American continent was correct, although in contradiction to theories held by other people on the subject. I had always be-

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lieved, for reasons which I shall fully explain later, that South America must be peopled by tribes of an Australoid or Papuan type: people who had got there directly from the west or southwest, not by people who had gradually drifted there from the north.

Some scientists, with no experience of travel, have been greatly misled by the fact that the North American Indians are decidedly a Mongolian race. Therefore they assumed, basing their assumption on incorrect data, that the unknown Indians of South America must also be Mongolian. This was a mistake, although undoubtedly migrations on a comparatively small scale of Indians from North to South America must have taken place, chiefly along the western American coast. Those tribes, however, unaccustomed to high mountains, never crossed the Andes. Whatever types of Indians with Mongolian characteristics were found settled in South America were to be found to the west of the Andes and not to the east. This does not of course mean that in recent years, when roads and railways and steamships have been established, and communication made comparatively easy, individuals or families may not have been conveyed from one coast to the other of the South American continent. But I wish my reader to keep in mind for a moment a clear distinction between the Indians of the western coast and the Indians of the interior.

To return to our man: I was greatly impressed by the strongly Australoid or Papuan nose he possessed: in other words, broad, with the lower part forming a flattened, depressed, somewhat enlarged hook with heavy nostrils. In profile his face was markedly convex, not concave as in Mongolian faces. Then the glabella or central boss in the supra-orbital region, the nose, the chin, were prominent, the latter broad and well-rounded. The cheek-bones with him and other types of his tribe were prominent forwards, but not unduly broad laterally, so



TYPICAL BRAZILIAN PLATEAU.
Showing work of erosion.



ON THE PLATEAU OF MATTO GROSSO.
Alcides in foreground.



A FINE BORORO TYPE.
On a visit to author's camp.

BORORO CHARACTERISTICS

that the face in front view was, roughly speaking, of a long oval, but inclined to be more angular — almost shield-shaped. The lips were medium-sized and firmly closed, such as in more civilized people would denote great determination. His ears were covered up by long, jet-black hair, perfectly straight and somewhat coarse in texture, healthy-looking, and uniformly scattered upon the scalp. The hair was cut straight, horizontally high upon the forehead, which thus showed a considerable slant backward from the brow to the base of the hair. A small pigtail hung behind the head. The hair at the sides was left to grow down so as fully to cover the lobes of the ears, where again it was cut horizontally at the sides and back of the head. The top of the head was of great height, quite unlike a Mongolian cranium.

The eyes — close to the nose, and of a shiny dark brown — had their long axis nearly in one horizontal plane. They were set rather far back, were well cut, with thick upper eyelids, and placed somewhat high up against the brow ridges, so as to leave little room for exposure of the upper lid when open.

None of the other Indians, who had gradually assembled, wore a particle of clothing, barring a tight, conical collar of orange-coloured fibre encircling their genital organs — so tight that it almost cut into the skin. Without this solitary article of clothing no Indian man will allow himself to be seen by another, less still by a stranger. But with so modest an attire he feels as well-dressed as anybody. I think that this elegant article of fashion must have originated as a sanitary precaution, in order to prevent insects of all kinds, and particularly *carrapatos*, penetrating within — or else I was really at a loss to understand of what other use it could be. They themselves would not say, and only replied that all Bororo Indian men wore it. The Indians who had assembled all belonged to the Bororo tribe.

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On that, as well as on later occasions, I noticed two distinct types among the Bororos: one purely Papuan or Polynesian; the other strongly Malay. The characteristics of those two different types showed themselves markedly in every instance. The majority were perhaps of the Malay type. I was intensely interested at the astounding resemblance of these people to the piratical tribes of the Sulu Archipelago in the Celebes Sea, where, too, one meets a considerable amount of mixture of those two types, as well as specimens of pure types of the two races.

Among the Bororos many were the individuals — of the Malay type — who had the typical Malay eye *à fleur de tête*, prominent, almond-shaped, and slightly slanting at the outer angle. The nose, unlike that of Papuan types, was flattened in its upper region between the eyes, and somewhat button-like and turned up at the lower part; just the reverse of the Papuan types, who had prominent aquiline noses with a high bridge and globular point turned down instead of up.

The lips were in no case unduly prominent, nor thick. They were almost invariably kept tightly closed.

The form of the palate was highly curious from an anthropological point of view. It was almost rectangular, the angles of the front part being slightly wider than a right angle.

The front teeth were of great beauty, and were not set, as in most jaws, on a more or less marked curve, but were almost on a straight line, the incisors being almost absolutely vertical and meeting the side teeth at an angle of about 60°. The upper teeth overlapped the lower ones.

The chin was well developed — square and flattened in the Papuan types, but receding, flat, and small in the Malay types.

Both types were absolutely hairless on the face and body, which was partly natural and partly due to the

RACIAL FEATURES

tribal custom of pulling out carefully, one by one, each hair they possessed on the upper lip and upon the body — a most painful process. The women, as we shall see, in sign of deep mourning, also plucked out each hair of the scalp.

A striking characteristic of the head in Papuan types was the great breadth of the maximum transverse of the head, and the undue prominence of the supra-orbital ridges. Also, the great height of the forehead and its great width in its upper part were typical of the race. The maximum antero-posterior diameter of the skull was equal, in many cases, to the vertical length of the head, taken from the angle of the jaw to the apex of the skull.

The ears nearly invariably showed mean, under-developed lobes, but, strangely enough, were otherwise well shaped, with gracefully defined and chiselled curves. They were not unduly large, with a wonderfully well-formed concha, which fact explained why the acoustic properties of their oral organs were perfect. They made full use of this in long-distance signalling by means of acute whistles, of which the Bororos had a regular code.

The favourite form of earring adopted by the Bororos was a brass ring with a metal or shell crescent, not unlike the Turkish moon, but I do not think that this ornament was of Bororo origin. Very likely it was suggested by the cheap jewellery imported into Brazil by Turkish and Syrian traders.

They displayed powerful chests, with ribs well covered with flesh and muscle. With their dark yellow skins they were not unlike beautiful bronze torsi. The abdominal region was never unduly enlarged, perhaps owing to the fact that their digestion was good, and also because they took a considerable amount of daily exercise. In standing they kept their shoulders well back, the abdominal region being slightly in front of the chest. The head was usually slightly inclined downwards.

ACROSS UNKNOWN SOUTH AMERICA

The feet of the Bororos of the Malay type were generally stumpy, but this was not so with the higher Papuan types, who, on the contrary, had abnormally long toes and elongated feet, rather flattened. The Bororos used their toes almost as much as their fingers, and showed great dexterity in picking up things, or in spinning twine, when their toes did quite as much work as their fingers.

The colour of the iris of the Bororo eye was brown, with considerable discoloration around its outer periphery, and especially in the upper part, where it was covered by the lid. The eyes were generally kept half closed.

The anatomical detail of the body was perfectly balanced. The arms were powerful, but with fine, well-formed wrists, exquisitely chiselled, as were all the attachments of their limbs. They had quite graceful hands, long-fingered—in more ways than one—and wonderfully well-shaped, elongated, convex-faced nails, which would arouse the envy of many a lady of Western countries. The webbing between the fingers was infinitesimal, as with most Malay races. Great refinement of race was also to be noticed in the shape of their legs, which were marvellously modelled, without an ounce of extra flesh, and with small ankles.

The Bororos divided themselves into two separate families: the Bororo Cerados and the Bororo Tugareggi. The first descended from Baccoron; the second claimed descent from Ittibori. Baccoron lived where the sun set, in the west; Ittibori dwelt in the east.

I heard a strange legend in connection with their origin, in which they seemed proud of their descent from the jaguar, which to them represented the type of virility. A male jaguar, they said, had married a Bororo woman.

A sensible custom existed among the Bororos, as among the Tuaregs of the Sahara desert in Africa. The



BORORO MEN, SHOWING LIP ORNAMENT.



BORORO MEN.



BORORO INDIANS.

AN INTERESTING CUSTOM

children took the name of the mother and not of the father. The Bororos, like the Tuaregs, rightly claimed that there could be no mistake as to who the mother of a child was, but that certainty did not always apply to the father. This was decidedly a sensible law among the Bororos, who were most inconstant in their affections. They were seldom faithful to their wives, at least, for any length of time.

The Bororos were not prolific. They frequently indulged in criminal practices in order to dispose of their young: either by strangulation at birth or soon after, or by drugging their women before the birth of the child. The young, when allowed to live, took milk from their mothers until the ages of five or six years. The parents were extremely kind to their children; indeed, they were extraordinarily good-natured and considerate. Eight days after birth they perforated the lower lip of male children and inserted a pendant, taking that opportunity to give a name to the child. The lobes of the ears were perforated at the age of ten or twelve.

It was only at the age of about twenty that men were allowed to marry.

I found among the Bororos an interesting custom which I had seen but once before—in Central Asia, on the slopes of the Himalaya Mountains, among the Shoka tribesmen. I am referring to the “clubs,” called by the Bororos *Wai manna ghetgiao*. There the young men and girls went, not only with the object of selecting a wife or husband, but also to get thoroughly acquainted and see if the mate selected were suitable or not. The men sat on one side of the club-house—a mere hut—the women on the other. In a way, these clubs prevented hasty marriages, for the men were given plenty of time to study their prospective brides and the girls their future husbands. Curiously enough, in the Bororo country it was generally the woman who proposed to the man. When

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the official engagement was made, the man proceeded to the hut of his sweetheart and brought a gift of food for her and her mother. If the gifts were accepted, there was no other formality to be gone through, and the matrimonial ceremony was indeed of the simplest kind. The man took away the girl to his hut and they were man and wife.

The *cuisine* of the Bororos was not attractive to European palate, ears, or eyes. One of the favourite dishes of the Bororos, served on grand occasions, was the *mingao*, or Indian corn chewed up into a paste inside their mouths by women and then displayed before the guests in earthen pots filled with fresh water, in which it was then cooked.

The Bororos maintained that the sun, *Cervado*, and the moon, *Ittary*, were two brothers, both being males.

They believed in a superior Being, the essence of goodness and kindness: a Being who will never give pain or hurt anybody; therefore the Bororo, who was really at heart a great philosopher, never offered prayers to that superior Being. Why pray and worry one who will never injure us? they argued.

Then they believed in a wicked and revengeful devil, the *Boppé*, to whom constant attention was paid because by him was caused all the trouble that humans can have. Malady, accidents, disaster in love, in hunting or fishing expeditions—for all these the devil *Boppé* was responsible.

Then they had also another evil spirit—the *Aroe Taurari*—who, they said, often assumed the appearance of their ancestors in order to come and watch the games of the Bororos, such as wrestling and archery. Wrestling, in the catch-as-catch-can style, was one of their favourite games. They were very agile at it. Their favourite trick was to seize each other across the shoulders, each endeavouring to trip his opponent by a twisted leg round

THE TEST OF STRENGTH

his knee. Children in the *aldejas* were playing at this game all the time. In the Bororo wrestling-matches, it was sufficient to be thrown down to be the loser, and it was not essential to touch the ground with both shoulder-blades.

The only other game I saw among the Bororos was the test of strength. It was carried out with a most striking article—a great wheel made of sections, each one foot long, of the trunk of the burity palm tied together by double strings of fibre. The ribbon thus formed by them was rolled so as to make a solid wheel of heavy wood six feet in diameter. The whole was retained in a circular form by a strong belt of vegetable fibre. This great wheel was used by the Bororos in their sports, at festivals, for testing the strength of the most powerful men. It was so heavy that few men could lift it at all, the great test being actually to place it on one's head and keep it there for a length of time.

The Indians of South America, like the Indians of North America, revelled in decorating themselves with the feathers of brightly-coloured birds. The red, yellow, and blue giant macaws, fairly common in that region, paid dearly for this fashion of the Indians. Many of those poor birds were kept in captivity and plucked yearly of all their feathers, in order to make hair ornaments of beautiful blue and green plumage for the leading musician, who rattled the *bacco* (a gourd full of pebbles which can make a terrible noise), or else armlets, earrings, or necklaces. Some of the designs woven with the tiniest feathers of those birds were quite clever, and required delicate handling in their manufacture. Ducks, too, supplied many of the feathers for the ornaments of the Bororos.

Their cooking utensils were simple enough: merely a few large earthen bowls, badly baked and unglazed, the

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largest of which was seldom more than two feet in diameter. They broke easily, being made extremely thin.

The Bororos made basket-work by plaiting dried palm-leaves, but their most interesting work of all consisted in the really beautifully made fishing-nets. Nearly all the Indians of South America showed remarkable talent and patience at this work. The strings were twisted of a vegetable fibre, extremely resistant, and eminently suitable by its softness and regularity of diameter.

Whether owing to excitement, indigestion, or other causes, the Bororos had visions, which they attributed to the *Aroe Taurari*. In a certain way they were believers in the transmigration of the soul, not generally, but in specific cases.

There were certain Bororos who, by magic songs, professed to fascinate animals in the forest and were able to catch them. The *barih* or medicine-man generally assisted in those incantations.

The Bororos were remarkable walkers. They were extremely light on their feet and had a springy gait, most graceful to watch. A striking characteristic of these people was that, when standing, unlike nearly every other tribe of savages I have seen, they spread their toes outward instead of keeping both feet parallel. To a lesser extent the feet were held in that position also when walking. The suppleness of their bodies gave them a great advantage in penetrating with ease anywhere in the forest without having to cut their way through.

Both men and women were passionately fond of dancing, although their dancing had not reached any degree of perfection. With a strip of burity palm upon their shoulders they hopped around, monotonously chanting, with a rhythmic occasional jump, the women following the men.



BORORO MEN.
The aprons have been added.



BORORO WARRIORS.



BORORO WARRIORS.

AN EXHAUSTED RACE

The women possessed considerable endurance. They could carry heavy weights for long distances by means of a fibre headband resting on the forehead. Under those circumstances the body was kept inclined slightly forward. Children were also carried in a similar fashion in a sling, only, less practically than among many Asiatic and African tribes, the Bororo children were left to dangle their legs, thereby increasing the difficulty of carrying them, instead of sitting with legs astride across the mother's haunches. I was amazed to see until what age Bororo mothers and sisters would carry the young upon their shoulders; certainly children of five or six years of age were being carried about in this fashion, while such hard duties as pounding Indian corn, thrashing beans, and hut-building, were attended to.

Neither in women nor in men was the power of resistance in any way to be compared with that of the tribes of Central Africa or Asia. The Indian tribes of Brazil impressed one as being strong, because one compared them with their neighbours and masters, the Brazilians, who were physically one of the weakest, least-resisting races I have ever seen. When you compared them with some of the healthy savage races elsewhere, the Indians did not approach them in endurance and quickness of intellect. Do not forget that endurance is greatly due to brain power and self-control. The Indian races I saw in Brazil seemed to me almost exhausted physically, owing perhaps to constant intermarriage among themselves. The eyesight of the Bororos, for instance, was extremely bad. There were many in every *aldeja* who were almost or absolutely blind. The others were nearly all shortsighted.

The Bororos removed, pulled out, in fact, their eyelashes one by one, as they believed it improved their sight, especially for seeing at long distances. They all suffered more or less from complaints of the eyes. In-

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deed, I have seldom found races whose members had eyes in such poor condition. Conjunctivitis was the most prevalent form of eye disease. Ophthalmia was frequently met with. They seemed to have no efficacious method of curing those complaints, and the result was that one found an appalling number of blind or half-blind persons among them, quite out of proportion to the small population. The Bororos did not, of course, know of spectacles or any other way of protecting the eyes. Even when their eyes were in a normal condition, they nearly all had some defect of vision. Squinting was frequently to be noticed among them, and nearly invariably unevenness of the eyes. Cataract was common at a comparatively early age, and they knew no remedy for it. An abnormally marked discoloration of the upper part of the iris was constantly to be noticed, even in young people. Among the healthiest, I never saw one man or woman with extraordinary powers of vision such as are most common among savage tribes of Asia and Africa. The diseased condition of their blood was also perhaps to a certain extent responsible for this.

Their hearing was good, but not much more acute than with the average European, and infinitely inferior to that of the natives of Asia and Africa. They suffered considerably from the most terrible of blood complaints, general among them, also from leprosy, and various skin troubles.

The Bororos made considerable use of the *urucu* plant (*Bixa orellana* L.) which they called *nonoku*, from the fruit of which they obtained a brilliant red colouring matter for tinting their bows and arrows. The shell of the fruit contained a number of shiny seeds, which, when squashed, exuded a vivid red juice. It adhered easily to the skin of the forehead and cheeks, for which purpose also the Indians extensively used it.

The black paint which the Indians used for smearing

THUMB-MARKS

themselves across the forehead, cheeks, and upon the shoulders, from side to side, was made to stick to the skin and shine by mixing it with a resin.

The Bororos of the Rio Barreiros district carried five arrows each with them, but each family of Bororos used a special colour and also a different number of arrows, so that no particular rule could be laid down for the entire tribe. The red tinted arm-band which most men wore was called the *aguasso*.

Before starting on a hunting expedition of importance, the Bororos usually indulged in a feast.

I took a great number of thumb-marks among them, some of which were remarkable for the precision of the spiral lines from the central point, all over the thumb point. Others, in the longer thumbs, showed a peculiar deviation in the curve at the end, near the point of the thumb. Where the lines began to deviate, the triangle formed was filled in by other lines joining those of the spiral at sharp angles.

The experiments with the dynamometer in order to measure their strength, the anthropometric measurements with a calliper, and the printing of the thumb-marks, caused the Bororos first of all great anxiety, then boisterous amusement. They looked upon it all as utter nonsense — in a way I did not blame them — and repeatedly asked why I did it. I told them that I did it to find out where they came from.

“We are not monkeys,” said they; “we do not walk on our hands. If that is your object, you should look at our foot-marks on the ground, not at the marks of our hands!”

With these words, from a tracker’s point of view, the local wit set the entire company in shrieks of laughter at his quick repartee.

“Oh, yes!” said I; “but with the thumb-mark I may perhaps trace, not only where you come from but also

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where your great-grandfather, who is now dead, came from."

That was too much for them. All had been anxious to make a smudge with smoke-black upon my note-book. Now they all refused to do any more thumb-marking and walked away; but I had fortunately already acquired the marks I needed from them.

The Bororos, in fact, most Indian tribes of Central Brazil, knew nothing whatever of navigation. This was chiefly due to the fact that all the woods of Central Brazil had so high a specific gravity that not one of them would float. Hence the impossibility of making rafts, and the greatly increased difficulty in making boats. As for making dug-outs, the Indians had neither the patience nor the skill nor the tools to cut them out of solid trees. Moreover, there was really no reason why the Indians should take up navigation at all, when they could do very well without it. They could easily get across the smaller streams without boats, and they were too timid to go and attack inimical tribes on the opposite banks of unfordable rivers. Besides, the Indians were so few and the territory at their entire disposal so great, that there was no temptation for them to take up exploring, particularly by water.

They were all good swimmers. When the river was too deep to ford, they merely swam across; or else, if the river were too broad and swift, they improvised a kind of temporary raft with fascines or bundles of dried buriti leaves, to which they clung, and which they propelled with their feet. These fascines were quite sufficient to keep them afloat for a short time, enabling them also to convey a certain amount of goods across the water.

In other countries, such as in Central Africa, among the Shilucks and the Nuers of the Sobat River (Sudan), and the natives on Lake Tchad, I have seen a similar method adopted in a far more perfected fashion. The

NAVIGATION UNKNOWN

Shilucks, for instance, cleverly built big boats of fascines, large enough to carry a great number of warriors. Such was not the case with the bundles of burity of the Indians, which merely served for one or at the most two people at a time, and then only until the bundle became soaked, when it went to the bottom.

CHAPTER XV

BORORO SUPERSTITIONS — THE BORORO LANGUAGE — BORORO MUSIC

THE Bororos were superstitious to a degree. They believed in evil spirits. Some of these, they said, inhabited the earth; others were invisible and lived "all over the air," to use their expression. The aerial ones were not so bad as those on earth. It was to the latter that their invocations were made, not directly, but through a special individual called the *barih*, a kind of medicine man, who, shouting at the top of his voice while gazing skyward, offered gifts of food, meat, fish, and grain to the *boppé* or spirits invoked. There were two kinds of *barih*: a superior one with abnormal powers, and an inferior one. The *barih* eventually pretended that the spirit had entered his body. He then began to devour the food himself, in order to appease the hunger of his internal guest and become on friendly terms with him. The wife of the *barih*, who on those occasions stood by his side, was generally asked to partake of the meal, but only after the *barih* had half chewed the various viands, when he gracefully took them with his fingers from his own mouth and placed them between the expectant lips of his better half. She sometimes accepted them, sometimes not. All according to her appetite, I suppose, and perhaps to the temporary terms on which she was that day with her husband.

The Bororos, curiously enough, spoke constantly of the hippopotamus — *ajie*, as they called it — and even

THE *AJIE*

imitated to perfection the sounds made by that amphibious animal. This was indeed strange, because the hippopotamus did not exist in South America, nor has it ever been known to exist there. The women of the Bororos were in perfect terror of the *ajie*, which was supposed to appear sometimes, breaking through the earth. Personally, I believed that the *ajie* was a clever ruse of the Bororo men, in order to keep their women at home when they went on hunting expeditions. Boys were trained to whirl round from the end of a long pole a rectangular, flat piece of wood attached to a long fibre or a string. Its violent rotation round the pole reproduced to perfection the sounds of blowing and snorting of the hippopotamus. The whizzing of this device could be heard at astonishing distances. The credulous women were rendered absolutely miserable when they heard the unwelcome sounds of the *ajie*, and, truly believing in its approach, retired quickly to their huts, where, shivering with fright, they cried and implored to have their lives spared.

The boy who whirled the magic tablet was, of course, bound to keep the secret of the *ajie* from the women. Let me tell you that one of the chief virtues of the Bororo men, old and young, was the fidelity with which they could keep secrets. The youngest children were amazing at keeping secrets even from their own mothers. There were things that Bororo women were not allowed to know. Boys attended the tribal meetings of men, and had never been known to reveal the secrets there discussed, either to their sisters or mothers.

When I said it was a virtue, I should have added that that virtue was a mere development of an inborn, racial instinct. Young and old among the Bororo were extremely timid and secretive by nature. They feared everybody; they were afraid of each other. It was sufficient to watch their eyes, ever roaming, ever quickly

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attracted and pointing sharply at anything moving anywhere about, to be satisfied of the intense suspiciousness of these people.

The Bororos were restless nomads and could never settle anywhere. They were always on the move—hunting, fishing, and formerly on warlike expeditions with other tribes. They showed great skill with their arrows, which they threw with wonderful accuracy even under conditions of unusual difficulty. When fishing, for instance, they showed remarkable calculating powers when the line of vision became deviated by the surface of the water and made it difficult to judge the exact position of the fish at different depths. Their long arrows had a double-barbed, bone head, which was poisoned when fighting men.

The Bororos were not quarrelsome by nature; on the contrary, they were dignified and gentle. They always avoided fighting. It was only when driven to it, or when hunted down or attacked, that they naturally endeavoured to defend themselves. This has brought upon them the reputation of being barbarous and cruel savages. Even among themselves they seldom quarrelled; they never offended one another with words. They had great respect for their elders.

At night the men collected in the village. One of them spoke aloud to the crowd, delivering a regular lecture on the events of the day, their hunting or fishing adventures, or tribal affairs. The greatest attention was paid to the orator, and after his speech was over a warm but orderly discussion followed.

When a Bororo man was angry with another, he would not descend to vulgar language, but he generally armed himself with a bony spike of that deadly fish, the *raja* (*Rhinobates batis*) or *mehro*, as it was called in the Bororo language, which he fastened to a wristlet. With it he proceeded in search of his enemy, and on finding him,

THE GREATEST INSULT

inflicted a deep scratch upon his arm. This was considered by the Bororos the greatest insult a man could offer.

Women, as in most other countries, quarrelled more than men. Not unlike their Western sisters, they always, under such circumstances, yelled at the top of their voices, and then resorted to the effective and universal scratching process with their long, sharp nails.

It will be judged from this that it will not quite do to put down the Bororos as being as tame as lambs. Indeed, at the first look at their faces one is at once struck by the cruel expression upon them. They prided themselves greatly on having killed members of rival tribes, and more still upon doing away with Brazilians. In the latter case it was pardonable, because until quite recently the Brazilians have slaughtered the poor Indians of the near interior regions in a merciless way. Now, on the contrary, the Brazilian Government goes perhaps too far the other way in its endeavour to protect the few Indians who still remain within the Republic.

The more accessible tribes, such as the insignificant ones on the Araguaya, were having a good time, valuable presents of clothes they did not want, phonographs, sewing machines, fashionable hats, patent leather shoes, automatic pistols and rifles being showered upon them by expensive expeditions specially sent out to them. It no doubt pleased an enthusiastic section of the Brazilian public to see a photograph of cannibal Indians before they met the expedition, without a stitch of clothing upon their backs — or fronts, to be accurate — and by its side another photograph taken half an hour later and labelled “Indians civilized and honoured citizens of the Republic,” in which you saw the same Indians, five or six, all dressed up and, it may be added, looking perfectly miserable, in clothes of the latest fashion. It would have been interesting to have taken a third photograph an hour after the second picture had been taken, in order to show how soon

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civilization — if donning a pair of trousers and shoes and a collar and tie can be called being civilized — can be discarded.

The news had spread by word of mouth down the Araguaya many months before that a Brazilian expedition would be sent out with gifts, in order to befriend the Indians, supposed to be innumerable, but only a few dozens, all counted, in reality. Seeing no expedition arrive, five or six of the Indians proceeded to travel some hundreds of miles to find it. The expedition, for lack of money, had remained stuck in a certain town. It was in that town that the valuable photographs were taken. No sooner had they said good-bye to their generous donors than the Indians left the city, quickly removed their clothes, which they exchanged for a few drinks of *aguardiente* (fire-water), and, as naked as before, returned to the shores of their beloved river.

Nevertheless the movement of the Brazilian Government was extremely praiseworthy and did it great credit. Like all movements of that kind, it was bound to go to excesses in the beginning, especially in Brazil, where people were very generous when they were generous at all. So far the fault has been on the right side. It will undoubtedly prevent in the future much severe, even cruel treatment which has been bestowed on the Indians.

It was a great pity, a very great pity, that this movement for the protection of the Indians had been started only when there were few pure Indians, almost none, left to protect. According to Brazilian statements, the wild Indians of Central Brazil amounted to some fifteen or twenty millions or thereabouts! A few, very few, thousands, perhaps only hundreds, would be nearer the truth. There were no great tribes left in their absolutely wild state anywhere in Brazil. There were a few small tribes or families scattered here and there, but it was seldom that these tribes numbered more than twenty or



THE HORRORS OF PHOTOGRAPHY. BORORO CHILDREN.



BORORO CHILD.
Showing strong Malay characteristics.

MIGRATIONS OF RACES

thirty members. If the tribe numbered fifty individuals, it was already a large tribe. Most of them contained merely six or eight members. So that really, in the population of Brazil, these tribes, instead of being the chief factor, were in fact a negligible quantity. It would be rash to make a statement as to the exact number of wild Indians in Brazil, for in a country so big, larger, as I have already stated, than the United States of America, Germany, Portugal, and a few other States taken together — and most of which was little known or absolutely unknown — it was not easy to produce an exact census.

During my journey, which crossed that immense country in a zigzag from one end to the other in its broader width, and covered all the most important regions of the Republic, I became assured that few indeed were the pure Indians to be found in Central Brazil. One went hundreds and hundreds of miles without meeting signs of them; and that in localities where they were supposed to be swarming. The Bororos, a few dozens of them, all counted, in two or three different subdivisions, were perhaps the strongest wild tribe in all the immense State of Matto Grosso.

As I have said, I was greatly impressed, from my first contact with the Bororos, by the strongly Polynesian appearance of some of them. The more specimens I saw, the more I became convinced that they were of the same race. In fact, I began to speculate whether the people of Australia and Polynesia had migrated here or whether it was just the other way, which theory might also be plausibly upheld, viz.: that the people of Central South America had migrated to the west, into Polynesia and Australia. Many theories have been expounded of how races always follow certain rules in their migrations, but in my own experience I find that those theories are not invariably correct. Again, it does not do to rely too much on the resemblance of words in establishing

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a relationship between two or more races. Nor, indeed, can one trust absolutely to the resemblance in the rudimentary ornamentation of articles of use. If you happen to be a student of languages, and have studied dozens of them, you will soon discover how words will travel across entire continents. They can often be traced back to their origin by the knowledge of intermediate languages through which, with distortions, those words have passed. In Central Africa I actually heard words of Mongolian origin, and not only that, but even traced Mongolian characteristics in the type of the ruling classes of natives, as well as in the construction of their language.

It is easy to be occasionally misled. I remember on my journey across Africa how amazed I was at first at hearing some Tonkinese expressions used by the native cannibals. I really could not get over my amazement until I learnt that some years previously a number of Tonkinese convicts had been sent up the Congo and Ubanghi rivers by the French. Several of them had lived in that particular village of cannibals for some years. Hence the adoption of certain words which had remained in frequent use, whereas the Tonkinese individuals had disappeared.

I took special care in Brazil, when making a vocabulary of the Bororo and other Indian languages, to select words which I ascertained were purely Indian and had not been contaminated by either imported Portuguese words or words from any other language. I was much struck by the extraordinary resemblance of many words in the language of the Indians of Central Brazil to the Malay language and to languages of Malay origin, which I had learnt in the Philippine Islands and the Sulu Archipelago.

For instance: the Sun, which is called in Malay *mata-ari*, usually abbreviated into *'ari*, was in the Bororo language *metiri*, and in the language of the Apiacar Indians of the Arinos-Juruena river, *ahra*, which indeed

THE BORORO LANGUAGE

closely resembles the Malay word. Moreover, the word *ahri* in the Bororo language indicated the *moon*—a most remarkable coincidence. It became slightly distorted into *zahir* in the Apiacar language.

Water, which is *poba* in Bororo and *üha* in Apiacar, was curiously enough *ühaig* in the Bagobo language (Mindanao Island), *po-heh* or *bo-heh* in the Bajao language (Mindanao Island), *ayer* in Malay, and *uhayeg* in Tiruray (west coast of Mindanao Island, Philippine Archipelago).

Father was *bapa* in Malay, and *pao* in Bororo. Many were the words which bore a slight resemblance, as if they had been derived from the same root. *Langan*, arm, in Malay, was *ankan-na* or *akkan-na*. Ear, in the Ilocano language (Philippine Archipelago) was *cabayag*; *aviyag* in Bororo. Hair in Ilocano, *böök*, in Manguianes *bohoc*, and in Sulu (Sulu Archipelago) *buhuc*; in Bororo it was *akkao*, which might easily be a corruption of the two former words.

I was greatly interested, even surprised, to find that although those Indians lived thousands of miles on every side from the sea, and had never seen it, yet they talked of the *pobbo mae re u*—the immense water: (*pobbo*, water; *mae*, great; *re*, the; *u*, an expression of magnification such as our *oh*).

It was also interesting to note that they had specific words for water of streams, words which we do not possess in the English language, complete as our language is, such as down-stream, and up or against-stream—like the French *en aval* and *en amont*. The Bororo used *tche begki*, down-stream, and *tcheo bugkii*, up-stream.

The Bororo language was rudimentary in a way, yet most complete and extremely laconic, with innumerable contractions. The construction of sentences and the position of the verb were not unlike those of Latin languages.

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The chief wealth of the Bororo language consisted in its nouns. Like all savage languages, it was wonderfully rich in botanical and zoological terms. The gender was formed by a suffix, the masculine differing from the feminine.

There were in the Bororo language three genders, masculine, feminine, and neuter. The masculine was formed by adding the words *chireu*, *curi*, or *curireu*, to the noun; the feminine by the suffixes *chireuda* and *curireuda*. There were many words which were used unaltered for either gender. In the case of animals, the additional words *medo*, male, or *aredo*, female, clearly defined the sex, in specific cases where the names would otherwise be ambiguous. Inanimate objects had no sex, and were therefore neuter.

Most nouns had a plural as well as a singular, but there were exceptions to this rule, such as names of certain plants and animals, the sky, the wind, etc.; not to count things which were generally taken collectively, such as flies, *ruque*; macaw or macaws, *nabure*, etc.

The plural was made by the suffixes *doghe* or *maghe* — the *maghe* being used principally in possessive cases, such as *tori-doghe*, stones; *padje-maghe*, our mothers. Exceptions to this rule were the words ending in *bo*, *co*, *go*, or *mo*, to which the suffix *e* was sufficient to form the plural; whereas in those terminating in *do* or *no*, *ro*, or other consonants, the *o* was suppressed and an *e* placed in its stead. Example: *jomo*, otter, *jomoe*, otters; *cuno*, parrot, *cune*, parrots; *apodo*, or tucan (a bird), *apode*, tucans, etc.

There were a number of irregular exceptions, such as *aredo*, wife; *areme*, wives; *medo*, man, *ime*, men. Perhaps the most curious of plurals was *ore*, sons, the singular of which was *anareghedo* (son).

The words ending in *go* generally formed the plural with an interchangeable *ghe*.

THE VERB

The pronouns were:

<i>imi</i> = I	<i>sheghi</i> or <i>paghi</i> = we
<i>aki</i> = thou	<i>taghi</i> = you
<i>ema</i> = he or she	<i>emaghi</i> = they

When immediately before a verb these were abbreviated into *I* or *it*, *a* or *ac*, *e* or *ei*, *pa* or *pag*, *ta* or *tag*, *e* or *et* — I, thou, he or she, we, you, they, according to their preceding a vowel or a consonant. With words beginning with a consonant only the first syllable of the pronoun was used.

The verb itself did not vary in the various persons, but it did vary in its tenses by suffixes, sometimes after the pronoun, sometimes after the verb. In the present tense the Bororos generally used for the purpose the word *nure*, usually between the pronoun and the verb, with the pronoun occasionally repeated after the *nure*; but in general conversation, which was laconic, the pronoun was frequently suppressed altogether — similarly to the frequent omission of the pronoun in the English telegraphic language.

There were various other forms of pronouns, but I could not quite define their absolute use — such as the *tched* or *tcheghi*, which seemed to include everybody, corresponding to the English *we* in orations which includes the entire audience, or the whole nation, or even the entire human race.

The Bororo language was complete enough, the conjugation of verbs being clearly defined into past, present, imperative, and future.

The past was formed by interpolating between the pronoun and verb the words *re gurai*, generally abbreviated into *re*. The imperative was made chiefly by the accentuation of the words, and was susceptible of inflexion in the second person singular and plural. The future was formed by adding, sometimes after the

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pronoun, sometimes after the verb, the words *modde*, *uo*, or *ua*.

At the end of the second volume, in the Appendix, will be found a vocabulary of useful words needed in daily conversation which I collected during my visit to the Bororos. I had made a much more complete dictionary of their language, in a book which I kept for the purpose, but unfortunately the book was lost with a great many other things, in an accident I had some months later on the Arinos River.

It was not possible to say that the Bororos shone in intelligence. It was seldom one found an individual who could count beyond two. Everything in the Bororo country was reckoned in couples, with the aid of fingers, thumbs, and toes. The learned could thus reach up to twenty, or ten pair, but beyond twenty no Bororo dared venture in his calculations. They had no written language, no sculptures or paintings, no carved idols. Their artistic talent seemed limited to occasionally incising rudimentary representations of horns, footprints, and line figures on rocks.

They showed great skill in the manufacture of their arrows, which were indeed constructed on most scientific lines, and were turned out with wonderful workmanship. The arrows were from four to five feet long, and were chiefly remarkable for the intelligent and highly scientific disposition of the two balancing parrot feathers, gently bent into a well-studied spiral curve, so as to produce a rotary movement, united with perfect balance, in the travelling weapon. The arrows were manufactured out of hard, beautifully polished black or white wood, and were provided with a point of bamboo one third the length of the entire arrow. That bamboo point was tightly fastened to the rod by means of a careful and very precisely made contrivance of split cane fibre.

The Bororos used various-shaped arrow-heads, some

THE SONGS OF THE BOROROS

triangular, others flattened on one side with a raised rib on the opposite side, others triangular in section, with hollowed longitudinal grooves in each face of the triangle in the pyramid, making the wound inflicted a deadly one. Others, more uncommon, possessed a quadruple barbed point of bone.

The favourite style of arrows, however, seldom had a point broader in diameter than the stick of the arrow.

The music of the Bororos — purely vocal — had three different rhythms: one not unlike a slow waltz, most plaintive and melancholy; the second was rather of a loud, warlike character, vivacious, with ululations and modulations. The third and most common was a sad melody, not too quick nor too slow, with temporary accelerations to suit words of a more slippery character in their pronunciation, or when sung in a *pianissimo* tone.

The songs of the Bororos could be divided into hunting songs, war songs, love songs, and descriptive songs and recitatives.

They were fond of music in itself, and possessed fairly musical ears. They were able to retain and repeat melodies quite foreign to them. Their hearing was acute enough to discern, with a little practice, even small intervals, and they could fairly accurately hit a note which was sung to them. They had flexible voices, quite soft and musical, even in conversation.

In males, as far as I was able to judge, baritone voices were the most prevalent; in female voices, soprano. Their typical songs were chiefly performed in a chorus by men only, although once or twice I heard solos, which, nevertheless, always had a refrain for the chorus. The Bororos sang in fair harmony more than in unison, keeping regular time, and with occasional bass notes and noises by way of accompaniment. They possessed no musical instruments of any importance, a most primitive flute, and one or several gourds filled with seeds or pebbles,

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being, as far as I could trace, the only two musical instruments among them.

Their songs contained progressions in chromatic intervals. Those progressions were not only frequently repeated in the same melody, but some of the favourite ones recurred in several of their melodies. They frequently broke from one key into another, not gradually or with modulations, but very abruptly. There were constant and sudden changes in the *tempo* of their melodies, accelerations being frequently caused by excitement in the performers, by incidents occurring, by anger or other passions being aroused. They had no set rules, nor, of course, any written music. The melodies were sung according to the temporary feelings of the performers, who occasionally adorned their performances with variations. Practically they improvised, if led by a musical talent, as they went along. Still, mind you, even when they improvised, the character of the songs was the same, although they may have added so many variations and embellishments to the theme as to make it impossible to identify them. Furthermore, no two choruses ever sang the same songs alike, nor did the same chorus sing the same song twice alike. There were in their melodies great changes in the degree of loudness. Those changes generally were gradual, although often extremely rapid.

The Bororos seemed to be greatly carried away by music, which had upon them quite an intoxicating effect. There were certain high notes and chords in a minor key which had a great attraction for them, and which constantly recurred in their melodies and their lengthy ululations. Some of the notes had undoubtedly been suggested by the song of local birds and by sounds of wild animals. The Bororos were good imitators of sounds, which they could often reproduce to perfection. They were observant with their ears — much more so than with

IMITATIVE POWERS

their eyes. Even in conversation the Bororos would often repeat, accurately enough, noises they heard around them, such as the crashing of falling trees, of rushing water, of distant thunder, or foreign words which caught their fancy. I was amazed at their excellent memory in that direction.

There were no professional musicians in the Bororo country in the strict sense of the word, the *barih* being the only person who might, at a stretch, be put down as one. Nor was anybody taught music. They were one and all musicians without knowing it, or at least thought they were, a belief not monopolized by the Bororos only. They all sang. They learned to sing gradually by hearing and imitating their elders.

I think that with the Bororos the steps of their dances had been suggested by the rhythm of the music, and not the other way round. They preferred music to dancing, for which latter exercise they showed little aptitude. Although their melodies would appear appallingly melancholy to European ears, it did not follow that they were so to them. On the contrary, some which had a most depressing effect on me — and I felt like throwing at them anything handy but heavy to interrupt the melody — seemed to send the performers into a state of absolute beatitude. They kept up those melodies interminably, repeating the same short theme dozens of times, hundreds, in fact, if nothing happened to stop them. When once they had started on one of those songs, it was difficult to switch them on to another. They loved to hear it again and again.

The time of their music was “common” time, slightly modified according to the wording of the song. It generally altered into a triple time when the words were of a liquid quality in their pronunciation, and a dual time when sung low and slowly.

When singing, especially during ululations, the

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Bororos swung their bodies forward and backward, not unlike the howling dervishes of Egypt, uttering occasional high and strident notes. This was generally done before starting *en masse* on a hunt, when a feast also took place.

The women never joined in the songs, but the boys did. Even if their voices were not powerful enough to produce lengthy ululations, they spiritedly took part in the violent undulations of the body.

The Bororos were great lovers of minute detail. So it was that, in their music, strange, weird effects were attempted, wonderfully complicated.

Bororo singing occasionally took the form of a recitative, with the chorus joining in the refrain — this principally when chanting the merits of a deceased person, or during some calamity in the *aldeja*, or village.

The musical instruments I was able to find in the various settlements of Bororos I visited consisted chiefly of single, double, or treble gourds, the latter with perforations at the two ends, used as wind instruments and producing deep bass notes. The single gourd had a cane attachment intended to emit shrill high notes. Then there were other dried gourds filled with pebbles, which rattled as they were shaken at the end of a long handle to which the gourds were fastened.

The cane flutes were slightly more elaborate, with ornaments of rings of black feathers. There was only one rectangular slit in the centre of the flute, so that only one note could be produced — as was the case with most of their rudimentary musical instruments.

CHAPTER XVI

BORORO LEGENDS — THE RELIGION OF THE BOROROS — FUNERAL RITES

THE Bororos believed in spirits of the mountains and the forest, which haunted special places in order to do harm to living beings. Those spirits came out at night. They stole, ill-treated, and killed. In rocks, said the Bororos, dwelt their ancestors in the shape of parrots. The Bororos were greatly affected by dreams and nightmares, which they regarded as events that had actually happened and which generally brought bad luck. They were often the communications of evil spirits, or of the souls of ancestors. The Bororos had many superstitions regarding animals, which they individualized in their legends, giving them human intelligence, especially the *colibri* (humming-bird), the macaw, the monkey, the deer, and the leopard.

The stars, according to these savages, were all Bororo boys. Let me give you a strange legend concerning them.

“The women of the *aldeja* had gone to pick Indian corn. The men were out hunting. Only the old women had remained in the *aldeja* with the children. With an old woman was her nephew, playing with a bow and arrow. The arrows had perforated sticks, which the boy filled with Indian corn. When the boy had arrived home, he had asked his grandmother to make a kind of *polenta* with Indian corn. He had invited all the other boys of the *aldeja* to come and eat. While the grandmother was cooking, the children played, and between themselves

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decided to go to heaven. In the *aldeja* there lived an old woman and a red macaw. Both could speak. The boys, having eaten the *polenta*, cut off the woman's arms, tongue, and eyes, and tore out the tongue of the speaking bird. Having done this, they went into the forest, where they found a liana twisted into innumerable steps (in the Bororo language, *ippare*, young; *kugure*, multitude; *groiya*, step). They could not speak for fear of drawing attention, nor ask any one for help. They had taken the precaution of setting free all the captive birds in the *aldeja*, and they had flown away, except the *pío duddu* (the *colibri*), which they took with them into the forest. The boys gave a long liana, like a rope, to the *colibri*, requesting him to fasten it to the top of the highest tree, and another long liana which he must tie to the sky, where they all wished to ascend. The *colibri* tied the vegetable ropes as requested, and all the boys climbed up.

"The mothers, missing their children, went to the old woman and the speaking macaw.

"'Where are our children?' said they in a chorus.

"No answer. They were horrified when they perceived the mutilated woman and bird. They rushed out of the hut and saw the children — up — up — high, like tiny spots, climbing up the liana to heaven. The women went to the forest, to the spot where the boys had proceeded on their aerial trip, and showing the breasts that had milked them, entreated them to come down again. The appeal was in vain. The mothers, in despair, then proceeded to follow their children skyward up the liana.

"The youthful chieftain of the plot had gone up last. When he perceived the mothers gaining on them, he cut the liana. With a sonorous bump, the mothers dropped in a heap to the ground. That was why the Bororo women were resigned to see their sons in heaven, forming the stars, while they, the women themselves, remained the transmigrated souls of their mothers upon earth."



BORORO GIRLS.



BORORO WOMEN.



BOROROS SHOWING FORMATION OF HANDS.



BORORO WOMEN.
Showing method of carrying children.

BORORO LEGENDS

The Bororos also said that the stars were the houses of deceased children.

They believed that the sky vault, or heaven, formed part of the earth, and was inhabited. They proved this by saying that the vulture could be seen flying higher and higher until it disappeared. It went to perch and rest upon trees in heaven. The Milky Way in the sky — the *kuyedje è 'redduddo* (literally translated “stars they cinders”) — consisted for them merely of the flying cinders from the burning stars.

The sun, they stated, was made up entirely of dead *barih*, or medicine-men, who rose daily with red-hot irons before their faces. The *barihs* prowled about the earth at night, and went to the east in the morning on their return to the sun. The hot irons held by the *barihs* were merely held in order to warm the people on earth. At sunset the orb of day “came down to the water” beyond the horizon, and from there marched back to the east. The Bororos maintained that the heavy and regular footsteps of the sun walking across the earth at night could be heard plainly.

The moon, which was masculine to the Bororos, was the brother of the sun, and was similarly the home of *barihs* of minor importance.

The legends of the Bororos were generally long and somewhat confused. They were the outcome of extremely imaginative and extraordinarily retentive minds. Their imagination frequently ran away with them, so that it was not always easy to transcribe the legends so as to render them intelligible to the average reader, unaccustomed to the peculiar way of thinking and reasoning of savages. Yet there was generally a certain amount of humorous *vraisemblance* in their most impossible stories. Their morals, it should be remembered, were not quite the same as ours. There were frequently interminable descriptive details which one could on no

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account reproduce in print, and without them much of the point of the legends would be lost. So that, with the confusion and disorder of ideas of the Bororos, their peculiar ways of expression, and the mutilation necessary so as not to shock the public, the legends were hardly worth reproducing. Still, I shall give here one or two of the more interesting legends, which can be reproduced almost in their entirety.

“The sun and moon (two brothers, according to the Bororos) while hunting together began to play with arrows with blunt heads, such as those used by Bororos for catching birds alive. They hit each other in fun, but at last the sun shot one arrow with too much force and the moon died from the effects of the wound. The sun, unconcerned, left his dying brother and continued hunting; but afterwards returned with medicinal leaves which he placed on the wound of the moon. According to Bororo fashion, he even covered the dying brother entirely with leaves, when he saw his approaching end. When he discovered that the moon was dead, he became frightened and left. That is why the moon, which when alive was once as bright as the sun, is now of less splendour. It is because it is dead, and the sun is still alive.”

The Bororos firmly believed that formerly the world was peopled by monkeys. This was rather an interesting legend, as it would point out that the Bororos, in any case, were aware that the world was once inhabited by a hairy race, which they called monkeys. It is quite remarkable that a similar legend was found among many of the tribes of the Philippine Islands and Sulu Archipelago, and along the coast of the Eastern Asiatic continent. The Bororos stated that they learnt from monkeys how to make a fire. Monkeys were their ancestors. The whole world was peopled by monkeys in those days. Monkeys made canoes, too.

“One day a monkey and a hare went fishing together

THE MONKEY AND THE JAGUAR

in a canoe in which they had taken a good supply of Indian corn. While the monkey was paddling, the hare was eating up all the corn. When the corn had been entirely disposed of, in its irresistible desire to use its incisors, the hare began to gnaw the sides of the canoe. The monkey reprimanded the hare, and warned it that the canoe would sink, and as the hare was not a good swimmer it would probably get drowned, or be eaten by fish which swarmed in the stream. The hare would not listen to the advice, and continued in its work of destruction. A hole was bored in the side of the canoe, which promptly sank. The hare, being a slow swimmer, according to Bororo notions, was immediately surrounded by swarms of *doviado* (gold fish) and speedily devoured. The monkey, an excellent swimmer, not only was able to save its life, but, seizing a big fish, dragged it on shore.

“A jaguar came along and, licking its paws, asked whether the monkey had killed the fish for its (the jaguar’s) dinner.

“‘Yes,’ said the monkey.

“‘Where is the fire for cooking it?’ replied the jaguar.

“The sun was just setting. The monkey suggested that the jaguar should go and collect some dried wood in order to make the fire. The sun was peeping through the branches and foliage of the forest. The jaguar went, and returned with nothing; but in the meantime the monkey, with two pieces of soft wood, had lighted a fire and eaten the fish, leaving a heap of bones. When the jaguar arrived, the monkey leapt in a few jumps to the top of a tree.

“‘Come down!’ said the jaguar.

“‘Certainly not!’ said the monkey. Upon which the jaguar requested its friend the Wind to shake the tree with all its fury. The Wind did, and the monkey dropped into the jaguar’s mouth, from which it immediately passed into the digestive organs. The monkey little by little

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moved its arms in the close quarters in which it found itself, and was able to seize the knife which it carried, in the most approved Bororo fashion, slung across its back. Armed with this, it split the jaguar's belly and resumed its daily occupation of jumping from tree to tree."

I was able to record yet another strange legend on the preservation of fire.

"An otter," said the legend, "in days long gone by, had with great difficulty lighted a fire on the bank of a river. The sun first came to warm itself by the fire, and while the otter had gone on one of its aquatic expeditions, the moon arrived too. The sun and moon together, feeling in a mischievous mood, put out the fire with water not extra clean. Then they ran for all they were worth. The otter, feeling cold, came out of the water and, to its amazement, found the fire had been extinguished.

"'Who did it?' cried the furious otter, wishing to kill whoever had put the fire out. While its anger was at its highest, the otter perceived a toad, which was accused of extinguishing the fire because its legs were as red as fire.

"'Do not kill me!' appealed the toad. 'Put your feet on my belly.' The request was at once granted. The toad opened its mouth wide, and with the pressure of the otter's paws upon its body, a burning coal was ejected from its interior anatomy. The otter spared the toad's life in recognition of its services in preserving the fire. That is why the otter and the toad have been friends ever since."

It was not easy to collect legends from the Bororos, as only few of them were inclined to speak. The same legend I found had many variations, according to the more or less imaginative mind of the narrator.

Here is an extraordinary explanation of the origin of lightning.

THE ORIGIN OF LIGHTNING

“A boy had violated his own mother. His father, discovering the misdeed and wishing to punish him severely, in fact, get rid of the boy altogether, sent him to several dangerous places to collect various things for him, such as wild fruit, etc. The son, fearing disaster, went to his grandmother for help. She in turn called first one bird and then another for their advice. The father had sent his son to fetch some small gourds (*bappo rogo*), which grew floating on or suspended above the water of a lagoon. But the lagoon was filled with the souls of deceased Bororos and evil spirits. In the first instance the grandmother begged for the help of the *pio duddo* (or *colibri*). This obliging bird accompanied the boy to the lagoon and, flying over the water, with its beak cut the twigs of the small gourds, and one by one brought them to the boy, who had wisely remained on dry land in order not to be seized by the evil spirits which lay concealed in the water. When the bird was about to bring the dried gourds back, the seeds which were inside rattled and aroused the evil spirits of the lagoon. Up they all sprang; but the *colibri* was too swift for them, and the gourds were safely delivered to the boy. The boy brought them to his father, who, amazed at seeing his son still alive, sent him next to fetch some large gourds, such as those used by the *barih* at funerals and in high ceremonies.

“The boy went once more to his grandmother, and she this time recommended him to a dove (*metugo*). When the dove and the boy arrived at the lake, the dove cut some large gourds, but, unfortunately, in so doing made a noise. The souls and evil spirits of the lake leapt out and dispatched numerous arrows to kill the dove, but, as luck would have it, dove and *bappo* (gourds) escaped unhurt. The boy handed the large gourds to his astounded father, who could not imagine how the boy had escaped death a second time.

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“The Bororos used in their dances the nails of wild pigs, which they attached to their feet in order to produce a noise something like castanets. That ornament was called a *buttori*.

“The father next ordered his son to go and bring back a complete set to form a *buttori*. For some reason or other, according to the legend, the *buttori* was also found suspended over the lagoon swarming with souls and evil spirits. The grandmother on this occasion advised the son to accept the services of a large, beautifully coloured locust, called by the Bororos *mannori*. The *mannori*, however, made so much noise while on its errand that it became riddled with arrows from the angry spirits of the lake. To this day, say the Bororos, you can see a lot of white spots all over the body of the *mannori*. Each marks the spot of a former wound. But the *mannori*, too, faithfully delivered the foot ornaments to the youth. The youth brought them to his father, who, in amazement and vicious anger, ordered his son to go with him on the mountain to seize the nest of the *cibae* (vulture). According to the notions of the Bororos, the souls of their dead transmigrate into the bodies of birds and other animals.

“The young fellow again paid a visit to his wise grandmother, who was this time greatly upset. She handed him a stick and requested him to insert it at once into the vulture’s nest, when they had arrived in the hollow in the rock where the nest was. The boy departed with his father up the precipitous mountain side. When they had nearly reached the nest the father placed a long stick across a precipice and ordered his son to climb on it and seize the nest. The son duly climbed, carrying with him his grandmother’s stick. When he had reached the top, the father did all he could to shake the son down into the chasm, and even removed the long stick on which he had climbed. But the lucky boy had already

LIZARDS AND VULTURES

inserted his grandmother's stick into the crevasse and remained suspended, while the father, really believing that he had at last succeeded in disposing of his son, gaily returned to the *aldeja* (village). The son, taking advantage of a liana festooned along the rock, was able to climb to the very summit of the mountain. There, tired and hungry, he improvised a bow and arrow with what materials he could find, and killed some lizards. He ate many, and hung the others to his belt. He went fast asleep. With the heat, the fast decomposing lizards began to smell. The odour attracted several vultures, which began to peck at him, especially in the softer parts behind (for he was sleeping lying on his chest and face, as Bororos generally do). The boy was too tired and worn to be awakened. The vultures then seized him by his belt and arms, and, taking to flight, soared down and deposited him at the foot of the mountain. There the boy woke up, famished. His supply of lizards had been eaten by the vultures. He searched for fruit and ate some, but he could not retain his food owing to injuries caused him by the vultures." (Here a good portion of the legend has to be suppressed.)

"As best he could, the boy went to look for the *aldeja*, but it had vanished. He walked for several days, unable to find traces of his tribe. At last he found the footmarks which they had left upon their passage. He followed them, and came to a fire freshly made, left by the Indians. He went on until he identified the footmarks showing where his grandmother had gone. He made sure they were hers by the extra mark of her stick on the ground. With the assistance of a lizard, then of a big bird, then of a rat, then of a butterfly, he discovered the whereabouts of the old lady. He was by then an old man. Upon perceiving his grandmother, he again became a boy, and hurried on, making a noise that she might know him again. She asked another nephew: 'Look and see who is

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behind!’ The nephew turned round and recognized his eldest brother — who was also his father. The grandmother embraced him tenderly.

“The eldest fellow persuaded his grandmother and brother not to return to the *aldeja* where he had suffered so much from the hands of his father.

“‘They have made me suffer,’ he said, ‘and I shall take my revenge. Come with me, and we shall all be happy together.’

“They went to a beautiful spot. He climbed a mountain, and from there proceeded to produce lightning, thunder, and wind, which exterminated the rest of the tribe in the *aldeja*. That is why, when the Bororos see lightning, they say that it is some one’s vengeance coming upon them.”

In the Bororo language, lightning was called *boeru goddo* or “angry people”; thunder was *bai gabe* when near, and *boya ruru* — or deaf sound — when distant.

The Bororos related an interesting legend of a great flood or deluge.

“One night a Bororo went with his bow and arrows to the river in order to fish, at a spot where a cane snare or trap had been made in the stream. He killed a sacred fish. No sooner had he done this than the water immediately began to rise. He was scarcely able to get out of the water and run up the mountain side, lighting his way with the torch of resinous wood he had used in order to attract the fish while fishing. The water kept almost overtaking him, it rose so rapidly. He called out to the Bororos of his tribe to make their escape, as the water would soon drown them, but they did not believe him, and consequently all except himself perished. When he reached the summit of the mountain, he managed to light a big fire just before the rising water was wetting the soles of his feet. He was still shouting in vain to all

THE DELUGE

the Bororos to run for their lives. The water was touching his feet, when he thought of a novel expedient. He began to remove the red-hot stones which had lain under the fire and threw them right and left into the water. By rapid evaporation (at the contact of the hot missiles, it is to be presumed, as the legend does not say) the water ceased to rise. In fact, the water gradually retired, and the Bororo eventually returned to the spot where he had left the tribesmen. All were dead. He went one day into the forest and he found a doe, which had in some mysterious way escaped death, and he took her for his wife. From this strange union were born children who were hornless and quite human, except that they were very hairy. After a few generations the hair entirely disappeared. That was how the Bororo race was preserved."

That extraordinary legend was, to my mind, a very interesting one, not in itself, but from several facts which in its ignorant language it contained. First of all, the knowledge of the Bororos concerning a former hairy race — a hairy race referred to in legends found all over the Eastern Asiatic coast and on many of the islands in the Pacific from the Kuriles as far as Borneo. Then it would clearly suggest a great deluge and flood which most certainly took place in South America in days long gone by, and was indeed quelled by burning stones — not, of course, thrown by the hands of a Bororo, from the summit of a mountain, but by a great volcanic eruption spitting fire and molten rocks.

As I have stated elsewhere, there was every possible indication in Central Brazil that torrential rains on an inconceivable scale, naturally followed by unparalleled floods, had taken place, in the company of or followed by volcanic activity on a scale beyond all imagination. One had only to turn one's head round and gaze at the scenery almost anywhere in Central Brazil, but in Matto Grosso

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particularly, to notice to what extent erosion and volcanic activity had done their work.

Another curious belief of the Bororos was worth remembering. They claimed that men and women did not come from monkeys, but that once upon a time monkeys were human and could speak. They lived in huts and slept in hammocks.

The Bororos possessed no geographical knowledge. Beyond their immediate neighbourhood they knew of no other place, and did not in any way realize the shape or size of the earth.

They called themselves *Orari nogu doghe*, or people who lived where the *pintado* fish (*orari* in Bororo) was to be found. The Bororos spoke of only three other tribes: the *Kaiamo doghe* (the Chavantes Indians), their bitter enemies; the *Ra rai doghe* — the long-legged people — ancient cave-dwellers, once the neighbours of the Bororos, but now extinct; and the *Baru gi ragguddu doghe* — a name better left untranslated — applied to a tribe living in grottoes.

In the way of religion the Bororos admitted five different heavens, in the last of which dwelt a Superior Being, a deity called the *Marebba*. Marebba's origin was unknown to the Bororos. All they knew was that he had a mother and a powerful son. Marebba only looked after the men, but he was so occupied that when the *barihs*, through whose mediation it was possible to communicate with him, wished to be heard, they had to shout at the top of their voices in order to attract his attention. Only the higher *barihs* could communicate with him, the lower *barihs* being merely permitted to communicate with his son.

They also believed in the existence of a bad god, an evil spirit called *Boppe*. Boppe inhabited the mountains, the tree-tops and the "red heaven." There were many *boppe*, male and female, and to them were due all the



BORORO WOMEN.



BORORO WOMEN.



BOROROS THRESHING INDIAN CORN.



A BORORO BLIND WOMAN.

TRANSMIGRATION OF THE SOUL

misfortunes which had afflicted the Bororos. Some of the *barihs* maintained that they had actually seen both Marebba and some of the *boppes*. They gave wonderful descriptions of them, comparing them in their appearance to human beings. The Bororos believed that in any food it was possible to find a *boppe*, there established in order to do evil. Therefore, before partaking of meals, especially at festivals, they first presented the *barih* with fruit, grain, meat, and fish in order to appease the anger of the evil spirits.

The Bororos believed in the transmigration of the soul into animals. They never ate deer, nor jaguar, nor vultures, because they thought that those animals contained the souls of their ancestors. The jaguar, as a rule, contained the soul of women. When a widower wished to marry a second time, he must first kill a jaguar, in order to free the soul of his first wife from suffering.

They also seemed to have an idea that the *arué*, or souls of the dead, might reappear in the world and could be seen by relatives. Men and women all became of one sex on leaving this world — all souls being feminine, according to the Bororos.

The apparition of the souls before their relatives was, of course, merely a clumsily arranged trick of the *barihs*. This is how it was done. They made a circle of branches of trees, in order to keep the audience at a distance, and then erected a large wooden gate, so arranged that when the souls appeared, it fell down in order to give them free passage. The souls, generally not more than two together, upon being called by the *barih*, entered the ring with their faces covered and hopping with a special step of their own. They did not respond to prayers or tears, and kept on twirling about within the ring. The body was that of a woman, wearing from the waist down a gown of palm leaves. The face was covered by a mask of vegetable fibre, which allowed its owner to see and not

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be seen. Upon the head was worn a cap of wax, in which were stuck a great number of arrows, so that it looked just like the back of a disturbed porcupine.

Naturally those "souls" were merely special girls dressed up for the occasion. But credulous Bororo women believed they were actually seeing the souls of their dead relatives. They worked themselves into a great state of excitement.

The same implement which was employed by the Bororos to reproduce the sound of the *aigi* or *ajie* (hippopotamus) — a board some ten inches long and three inches wide attached to a string and revolved from a long pole — was also used by them to announce the departure of souls from this world to the next. The women were ordered to cover their faces or hide altogether inside their huts when these noises were produced. Should one be curious enough to inquire into their origin and look, she was generally condemned to death, frequently by starvation. The Bacururu, or the Coroado Indians, believed that after such an indiscretion nothing could save the life of a woman.

Before starting on a hunting or fishing expedition, prayers were offered to the souls of the departed, so that they might not interfere with the success of the expedition, and if possible help instead.

The funeral rites of the Bororos were singular. On the death of a man, a chorus of moans began, and tears were shed in profusion, while some one sang for several days the praises of the defunct in a melancholy monotone. The body was covered for two entire days, during which all articles that belonged to the deceased, such as bow and arrows, pots, and musical instruments, were smashed or destroyed. The débris was stored behind a screen in the hut, where subsequently was also kept the hearse in which the body was conveyed to the burial spot. The body, wrapped in a palm-leaf mat, was then interred in

FUNERAL RITES

a shallow oval grave just outside his hut. A wooden beam was placed directly over the body, and then the hollow was covered over with some six or eight inches of earth. A few branches of trees and some thorns were thrown over it, to indicate the spot.

For twenty days, in the evening and night, moans resounded through the air. More tears were shed by the relatives and by the *barih*, who frequently proceeded to the grave to pour water on it. On the twentieth day, while some one set at play the awe-inspiring, revolving board, others proceeded to exhume the body, by then in a state of absolute decomposition. The remains were taken to the stream, and the bones cleaned with great care. The skull was placed within two inverted, hemispherical baskets, whereas all the other bones of the body were heaped into a third concave basket of a larger size.

It was on their return, with moans and chanting, to the *bayto*, or meeting-place in the *aldeja*, that the most touching scene ensued. The skull was decorated with a design of coloured feathers, while those present inflicted wounds upon their own bodies, shedding blood upon the basket of remains. The women, moreover, tore one by one each hair from their heads and bodies in sign of mourning.

After this the skull and bones were placed within another basket, and were either cremated or thrown to the bottom of a river. The property of the deceased was then set ablaze.

I noticed in a hut a skirt made of long palm leaves. It was donned at funerals. There were also several long, rudimentary flutes, formed by a cane cylinder with a rounded mouthpiece inserted into another. These flutes, too, were used only on such mournful occasions.

The *barih* received a present from relatives at the death of individuals in the tribe. The family remained

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in mourning from five to six months. The widow, at the death of her husband, was expected to tear each hair off her scalp, one by one, until her head remained as bald as a billiard-ball. She generally did it.

The corpses of women were treated slightly differently. When a woman died, she was buried *pro tem*. A feast was given to the tribe. The process of denudation having been given ample time to leave her skeleton clean, her bones were collected, and placed in a special basket, and then cremated. The ashes were scattered to the winds, and so were all her clothes, ornaments, chattels, smashed to atoms, and articles of food. Even fowls, if she possessed any, were destroyed. Usually they were eaten by her friends.

The Bororos did not possess a sense of honour resembling ours. Theft was not considered dishonourable, and was not looked down upon nor condemned by them. If a Bororo liked anything belonging to any one else, they could see no reason why he should not appropriate it. That was their simple way of reasoning, and as no police existed among them such theories were easily followed.

Taking something which belonged to a stranger was, in fact, rather encouraged, and in our experience we had to keep a sharp watch when Indians came to our camp, as things disappeared quickly. They seldom took the trouble to ask for anything; they just took it and ran away.

The measurements of Bororo heads on the table opposite, taken, as an average, from several of the most characteristic types, will be found of interest, especially when compared with some from Papuan and Malay tribes of the Philippine and Sulu Archipelagoes, with whom they have many points in common.

Due allowance must be made for the artificial deformation of the cranium in the case of the Bororos.

HEAD MEASUREMENTS

	Bororos.	Bilan, Island of Mindanao, Philippine Archipelago.	Manobo.	Mabummedans, West Coast of Mindanao I.	Guiangas.	Samal.	Bagobos.	Ilocanos.	Mandayas (Candia).	Tirurays.	Mansakas (of Panter).	Yacanes.
	Metre.	Metre.	Metre.	Metre.	Metre.	Metre.	Metre.	Metre.	Metre.	Metre.	Metre.	Metre.
Vertical maximum length of head	0.264	0.215	0.222	0.212	0.236	0.222	0.234	0.229	0.233	0.240	0.221	0.220
Bizygomatic breadth	0.1415	0.130	0.131	0.137	0.138	0.130	0.132	0.125	0.129	0.130	0.123	0.131
Maximum breadth of forehead	0.145											
Minimum breadth of forehead at lower part of temples	0.130	0.133	0.124	0.131	0.126	0.126	0.136	0.131	0.127	0.128	0.130	0.131
Maximum length of cranium (from forehead to back of head)	0.199	0.215	0.193	0.181	0.183	0.173	0.183	—	0.199	0.192	0.184	0.185
Breadth of skull one inch above ear	0.1945											
Maximum breadth of lower jaw	0.132	0.132	0.123	—	0.117	0.121	0.124	0.116	0.109	0.117	0.110	0.125
Length of nose	0.064	0.060	0.050	0.052	0.058	0.052	0.055	0.057	0.062	0.053	0.056	0.060
Breadth of nose at nostrils	0.0375	0.043	0.037	0.041	0.035	0.045	0.037	0.037	0.037	0.043	0.037	0.039
Distance between eyes	0.033	0.032	0.034	0.030	0.031	0.033	0.032	0.034	0.028	0.033	0.035	0.031
Length of ear	0.066	0.055	0.052	0.056	0.074	0.063	0.072	0.060	0.065	0.062	0.060	0.063
Length of mouth	0.057	0.065	0.050	0.050	0.056	0.055	0.050	—	0.052	0.057	—	0.055
Length of lower jaw from ear to centre of chin	0.1365											
Breadth of upper lip	0.025	0.023	0.021	0.017	0.023	0.020	0.027	0.024	0.022	0.024	0.021	0.020
Breadth of lower lip	0.020											

N. B. — For further particulars see "The Gens of the East," by A. H. Savage-Landor.

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I had no end of trouble in obtaining these measurements, as the Bororos would not hear of being measured. They were frightened of the nickel-plated calliper I used for the purpose. It was quite beyond them to understand why any one should want to know the length of their noses. In fact, although many, after a lot of coaxing, submitted to have other measurements taken, few of them would let me measure the nose. None at all would permit me to measure the length of their eyes, as they feared I would intentionally blind them.

I met other tribes of Bororos as I went along, and I was able to add to the curious information already collected and given in previous chapters. It appeared that at the birth of a child the head, while the skull was still soft, was intentionally compressed and bandaged, especially at the forehead and back, so as to flatten it and produce an abnormal shape of the skull. In many cases only the back of the head was flattened by the application of artificial pressure. The elongation was both upwards and sideways. This deformation was particularly confined to male children.

When twins were born, one was killed or else left to die in the sun, as they believed that the other could not live, if both were left alive. Murder for them, in that instance, was a question of humanity.

The Bororos had a perfect horror of natural death. They were terrified at the sight of a person dying. Therefore when one of their people was about to expire, they covered him up and placed him out of sight. If he or she under those circumstances delayed in departing this life, the departure was hastened by suffocation or strangulation. The Bororos were too restless, and could not wait too long for anything.

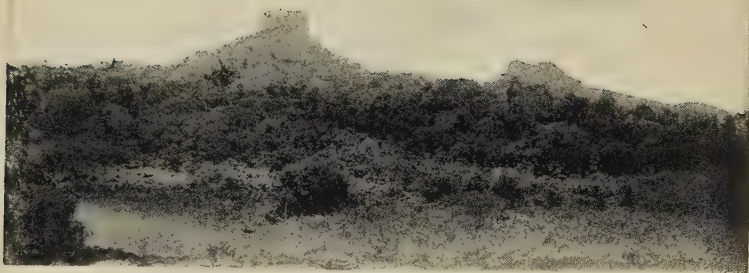
They were easily suggestionized. Many of them would make excellent subjects for hypnotic experiments. The women particularly were extraordinarily sensitive to



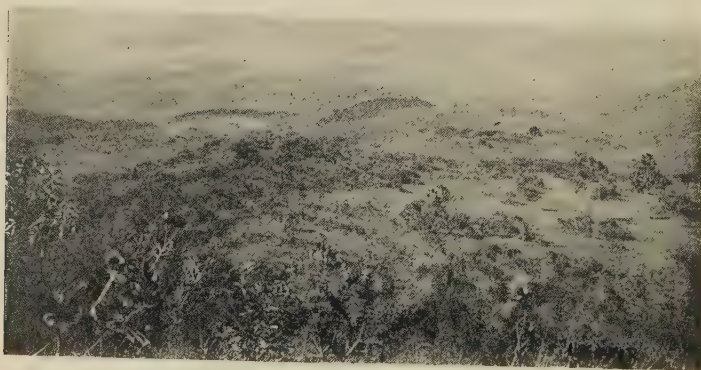
BORORO CHILDREN.



BORORO WOMEN.



ISOLATED CONICAL HILLS.
With tower-like rocky formation on summit.



THE ENDLESS CAMPOS OF MATTO GROSSO.

THE "SOUL THAT FALLS"

animal magnetism. They were much given to hysterical displays. One of the reasons which was given me for hastening the death of moribund Bororos was a curious superstition that the sight of a dying person would cause the death of women, particularly if the dying person happened to look in the direction of one woman present. The women believed this so firmly that occasionally, the Bororos asserted, women actually became ill and died when they saw a dead person. This, no doubt, may have occurred merely by suggestion. Women were never allowed, under ordinary circumstances, to see dead people.

When dancing, the Bororos sprang on one foot and then on the other, always hopping about in a circle.

Abnormalities and deformities were frequently noticeable among them, such as hare-lip, supernumerary toes and fingers, and hypertrophy of the limbs. Abnormalities of the genitals were general, owing to tribal customs.

One of the evil spirits most feared by the Bororos was called *aroi koddo*—or "soul that falls." It was a spirit that came to earth solely for the purpose of punishing the Bororos. They said that this spirit was an extremely noisy one, and its approach was announced by terrifying sounds.

The Bororos were frightened of comets and had about them superstitions similar to those of Europeans; that is to say, that their appearance caused illness, misfortune, and death. Solar and lunar eclipses, the Bororos stated, were merely the result of anger on the part of evil spirits. "The sun or moon were making faces because they were angry," was their highly astronomical explanation of the phenomenon.

The Bororos had a firm belief that some of their ancestors lived in the sun, others in the moon; and they said the ancestors caused the sun to make faces when

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angry. In the sun also lived the head of all the *barihs*, or medicine-men, the intermediary between humans and spirits; whereas in the moon dwelt only those who could invoke the souls of the ancestors. The *barih* was only capable of communicating with a *barih's* ancestors.

CHAPTER XVII

THE RIVER DAS GARÇAS — MAJESTIC SCENERY

I WENT to call on the Salesian Fathers. Between my camp and the river Das Garças, on the right bank of which the colony stood, there was a great dome of red volcanic rock with many loose boulders such as we had seen for the last three days of our journey. The river was swift and deep. The colony was on the opposite side of the water. We shouted until an Indian appeared and took us across in a rickety canoe belonging to the friars, which he paddled with the stalk of a palm-leaf.

The Salesians were remarkable people, and should be an example to many other missionaries. Wherever they went they did not trouble much about making converts. They taught the natives instead how to work the soil and how to make all kinds of articles which might or might not be useful to them as they became more civilized. The chief effort of the monks was to teach the natives agriculture, from which — charity always begins at home — the friars themselves were naturally the first to reap the benefit. At the same time the natives learned, and earned, and were made happy. They improved their mode of living and were, with great softness and patience, not only drawn nearer to Catholicism, but towards white people altogether. The Salesians had established on the Rio Das Garças — an enchanting spot — a beautiful farm, on which they grew quantities of Indian corn, sugar-cane, wheat, and all kinds of vegetables.

Although I am not a Roman Catholic, the Salesians

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received me very politely and took the greatest delight in showing me all over the Mission. It was interesting to note that everybody was working hard. The Father Superior himself was busy shaping a big table from a huge plank of hard wood, and nothing could induce him to leave his sweating work, not even his meals. Father Colli Agostino was detailed to go round and explain everything to me.

The Salesians had no trouble with the Indians, whom they found quite gentle and docile. But they could never be relied upon. One day the entire tribe would come and help to work the soil with great vigour; the next day they would all disappear from the neighbourhood, and no one knew where they had gone, sometimes for weeks. They invariably came back, sooner or later, and, what was more, they were always welcomed back.

Converting them to Christianity was a different matter. The Salesians had made little headway in that direction.

"We are patient people," said Father Colli; "it will come in time. Already the Bororos are beginning to join us in the church, where many enjoy singing with us. They are intelligent and soon learn to sing."

I purchased, at almost prohibitive prices, many things from the Salesians, principally food for my animals and men. Of course, in buying, one had to realize where we were, which made all the difference in the price. I was glad to pay them the money and obtain the commodities.

The Salesians told me that while digging to make the foundations for one of their buildings, they had found, only three feet under ground, in the sandy soil, several earthen pots of great antiquity, in excellent preservation, as well as a fireplace with ashes and charcoal. The sand had evidently accumulated in the valley below there, owing to wind and not to water. The frail pottery, imperfectly baked, would have crumbled away quickly in moisture.

A BEAUTIFUL VIEW

On May twentieth (minimum 58° Fahrenheit, maximum 85°) we were again off toward the west, travelling over great domes of red lava, the higher portions of which were covered by layers of ashes and red sand. We were at an elevation of 1,480 feet in the deep basin of the Rio Barreiros and Rio das Garças, but we soon went over three consecutive ridges, 1,550 feet above the sea level, with delicious campos and a *bosquet* of trees here and there. In the arc of a circle extending from northwest to southwest we had in front of us a beautiful view. Previous to reaching the third ridge, that day, we also had behind us a wonderful panorama of the great plateau described in a previous chapter.

On travelling over a fourth elevation, we found ourselves upon another immense dome of red volcanic rock, blackened on the surface, as if by fire, and with the peculiar striations we had noticed once or twice before. In this case there were cross striations as well, the direction of one set of parallel marks being from northwest to southeast, of the other set northeast to southwest, thus forming lozenges, each about sixty centimetres across. All those lozenges were so regularly cut that the *ensemble* gave the appearance of a well-made pavement. Then I noticed some peculiar great cavities in the rock, like those formed by glacial action. In fact, on a superficial examination, it seemed almost as if that region had first gone through a period of great revolution while in a state of semi-liquefaction, owing to intense heat from fire, after which a sudden and intense cooling had taken place and covered the country, perhaps even with ice. Whether the immense deposits of ashes and sand had been formed before or after the glacial period, if any such period ever existed in that particular region, could be merely a matter of speculation. In many places the sand, ashes, and red earth had almost consolidated into easily friable rock.

Where the actual rock was not exposed, we had

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campos, campos, campos, stretching as far as the eye could see. Far from being monotonous, one had, or at least I had, a delightful sensation in riding across those interminable prairies of beautiful green. One could breathe the pure air with fully expanded lungs, and in that silent, reposeful solitude one felt almost as if the whole world belonged to one. We were not much worried by insects on those great open places; it was only on getting near patches of vegetation and near streams that we suffered from the attacks of those pests.

We saw few trees, those all stunted and weak, as the padding of earth over the rocky under-strata did not permit their roots to go deep down, and therefore they grew up with difficulty and were anæmic.

Twelve kilometres from the Rio Barreiros we came to a stream (elevation 1,400 feet). On our left, rising above the inclined campos, was a triple undulation much higher than its neighbours. To the west stood two twin, well-rounded mounds, that my men named at once "the woman's breasts," which they much resembled.

We were still marching on deep deposits of ashes, and, higher, upon semi-hardened sandstone. On the northern side the twin hills had a different shape. They ended in a sharply pointed spur.

After going over an ochre-coloured, sandy region (elevation 1,530 feet above the sea level) we came again to magnificent, undulating campos, dotted here and there with dark green shrubs and *bosquets* to the north, northwest, and northeast.

Beyond, to the northeast, loomed again in the far distance our mysterious plateau, of a pure cobalt blue where in shadow. As one ran one's eye along its skyline, it was almost flat for more than half its length, then came a slight dip, followed by a terraced dome. Then again a straight line, followed by a slightly higher and more undulating sky-line with three steps in it, and a conical

AN EXTINCT CRATER

cal end at its eastern terminus. The most easterly point of all, the highest, resembled a castle with vertical sides. But of this we have already spoken, at the terminal point of the great divided range we had passed some days previously. The vertical cliffs of the plateau, where lighted by the sun, were of a brilliant red colour.

As we approached the twin hills they appeared to be the remains of an ancient crater. They formed, in fact, a crescent with a broken, rocky, lower section, completing the circle of the crater. I had no time to go and examine carefully, as it would have meant a deviation from my route, but that is how it appeared to me. There were, in fact, extra deep deposits of volcanic ashes at the foot of the descent before we arrived at the river Agua Emeindada, where we made our camp that night, fifteen kilometres from the Rio Barreiros.

My men went after game that night. Alcides killed a *veado* (deer), and we all enjoyed the fresh meat for dinner.

The clouds (cirro-stratus) were, during the entire day, in horizontal lines and slight, globular accumulations, the latter in a row and, taken *en masse*, giving also the impression of lines just above the horizon to the west. At sunset we once more saw the glorious effect of the radiation from the west, only instead of being straight lines there were, that time, feathery filaments, which rose in graceful curves overhead, like so many immense ostrich feathers. They joined again in a common centre to the east.

My men were complaining all the time of the intense cold at night, and made me feel almost as if I had been responsible for it. They grumbled perpetually. During the early hours of the morning their moans were incessant. They never ceased crying, as hysterical young girls might do, but as one would not expect of men. Some of them had toothache; and no wonder, when one looked at their

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terrible teeth and the way they ate. They devoured pounds of sugar every day, our supply, which should have lasted a year or more, having already almost been exhausted. It was impossible for me alone, with all the astronomical, geological, botanical, geographical, meteorological, photographic, anthropometric, and artistic work, not to mention the writing-up of my copious daily notes, also to keep a constant watch on the supplies. I handed over that responsibility to Alcides. Unfortunately, he was the greediest of the lot. Every time I warned him not to be so wasteful, as we should find ourselves dying of starvation, he and the others made me feel that I was meanness itself, and that I was only doing it to save money.

I never objected to their eating as much as they could, as I have always made it a point on all my expeditions to feed my men on the best food procurable, and give them as much as they could possibly devour. But it pained me to see quantities of good food thrown away daily, as I knew what it would mean to us later on.

"We are Brazilians," said they, "and like plenty to eat. When there is no more, we will go without food. You do not know Brazilians, but Brazilians can go thirty or forty days without anything to eat!"

"All right," said I, "we shall see."

Forty minutes, and perhaps not so long, had been, so far, the longest time I had seen them cease munching something or other. Not satisfied with the lavish food they were supplied with — heaps of it were always thrown to the dogs, after they had positively gorged themselves — they would pick up anything on the way: a wild fruit, a scented leaf of a tree, a nut of some kind or other, a *palmito*, a chunk of tobacco; all was inserted in the mouth. It was fortunate that we took enough exercise, or surely they would have all perished of indigestion. In my entire experience I have never seen men eat larger quantities of food and more recklessly than my Brazilian followers

RECKLESS FEEDERS

did. In the morning they were almost paralyzed with rheumatism and internal pains all over the body. Frequently those pains inside were accentuated by the experiments they made in eating all kinds of fruit, some of which was poisonous. Many a time on our march did we have to halt because one man or another was suddenly taken violently ill. My remedy on those occasions was to shove down their throats the end of a leather strap, which caused immediate vomiting; then, when we were in camp, I gave them a powerful dose of castor oil. After a few hours they recovered enough to go on.

On May twenty-first the minimum temperature of the atmosphere was 55° Fahrenheit, the maximum 79°, the elevation 1,250 feet at the stream Agua Emeindata. My men declared again they were half-frozen during the night and would not go on with me, as it was getting colder all the time, and they would certainly die. When I told them that it was not cold at all, that, on the contrary, I considered that temperature quite high, they would not believe me.

With the temperature in the sun during the day at 98°, most of the aches of the men disappeared, and I had little trouble with them until after sunset, when there was generally a considerable drop in the temperature.

We went on. We had a volcanic mountain to the left of us — half the crater of a volcano formed of red lava and friable, red-baked rock. In the northern and central part of the mountain were masses of lava, which had been shot out of the mouth of the volcano and had solidified into all kinds of fantastic forms, some sharply pointed, some red, others black. On the east side of the crater was a dome covered with earth, with an underlying flow of lava. Then could be observed a circular group of huge rocks, pear-shaped, with sharp points upward. While the volcano was active, these rocks had evidently stood on

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the rim of the then cylindrical crater. The mountain behind those rocks was formed by high accumulations of red volcanic sand, which in time, by the action of rain and sun, had gradually consolidated into soft rock.

The plateau extending northward, which was disclosed in all its entirety before me from the elevation of 1,600 feet which we had reached, also seemed to possess an extinct crater shaped like a crescent with steep slopes and two rounded promontories on its side.

The sky that day was partly covered by transparent feathery clouds and by dense mist near the horizon line to the east, but was quite clear to the west. As usual, that evening we were again treated to fairly handsome white lines radiating from the sun half way up the sky vault, but this time they were flimsy and not to be compared to the magnificent displays we had observed before.

Our animals still sank in ochre-coloured sand, or stumbled on conglomerate rocks of spattered lava pellets embedded in sandstone. Capping the higher undulations we again found deposits of ashes.

We travelled for long distances on a ridge at an elevation of 1,650 feet over a thick layer of sand and ashes mixed. Then campos spread before us, and upon them, here and there, grew stunted vegetation, the trees seldom reaching a greater height than fifteen feet.

From our last high point of vantage, the crater with fantastic rocks and its continuation we had observed appeared to form a great basin. A subsidiary vent was also noticeable. Farther on our march we found other immense deposits of grey ashes and sand alternately—one great stretch particularly, at an elevation of 1,600 feet. Water at that spot filtered through from underneath and rendered the slope a grassy meadow of the most refreshing green. We were rising all the time, first going northwest, then due north. At noon we had reached the highest point.



GEOMETRICAL PATTERN ON THE SURFACE OF A FLOW OF LAVA.
Caused by sudden contraction in cooling.



THE OBSERVATORY AT THE SALESIAN COLONY.
Padre Colbacchini in the foreground.



BORORO WOMEN AND CHILDREN.

ISOLATED PEAKS

From the high point on which we were (1,920 feet) we obtained a strange view to the west. Above the straight line of the plateau before us rose in the distance a pyramidal, steep-sided, sharply-pointed peak, standing in solitary grandeur upon that elevated plain. Why did it stand there alone? was the question one asked oneself; a question one had to ask oneself frequently as we proceeded farther and farther on our journey. We often came upon mountains standing alone, either on the top of tablelands or in the middle of extensive plains. Their presence seemed at first unaccountable.

Again, as we journey onward, the mules' hoofs were injured by treading over large expanses of lava pellets and sharp-edged, cutting, baked fragments of black rock, myriads of which also lay embedded in reddish, half-formed rock or buried in layers of yellowish-red earth.

To the north was a majestic panorama of the most delicate tones of blue and green, with almost overpowering, sweeping lines hardly interrupted by a slight indentation or a prominence rising above the sky-line. Only to the northwest, in the middle distance, was there the gentle, undulating line of magnificent campos — most regular in its curves, which spread in a crescent toward the west. The line was interrupted somewhat abruptly by a higher and irregular, three-terraced mass, but soon resumed its sweeping and regularly curved undulations beyond. This great crescent almost described a semicircle around the smaller undulations, over which we were travelling.

We descended to 1,750 feet. On facing west we had curious scenery on our left (south). A huge basin had sunk in, evidently by a sudden subsidence which had left on its northern side high vertical cliffs supporting the hill-range that remained standing. The undulating centre and sides of the immense depression formed beautiful campos, with an occasional *bosquet* of forest on the top

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of hills, and also on the lowest points of the undulations. Those *bosquets* were few and far apart, only to be found where moisture was plentiful. The remains of a high, flat plateau, which had escaped while the rest of the country had subsided, loomed alone in the distance.

One of the central hills was crowned by great, black, volcanic boulders of the same rock which was visible at the southern edge of this great basin, bounded by vertical cliffs — all of the same composition.

Directly southwest the evenness of the sky-line was again interrupted by two flat-topped mountains, one not unlike the gabled roof of a house, the other like a cylindrical tower on the top of a high, conical hill. We again rose to an elevation of 1,950 feet, still travelling on the summit of the plateau bordering the deep depression. We were compelled to describe a curve in our route, and had reached a height of 2,000 feet. We perceived to the northeast and east a long, uninterrupted — almost flat — sky-line. We had described a sweeping curve right round the irregular edge of the undulating plateau. We could now look back upon the southern aspect of the vertical black and brown rocky cliff, on the summit of which we had been travelling. The rocky cliffs were particularly precipitous and picturesque in the western portion. Interminable campos were still before us.

I occasionally picked up interesting plants and flowers for my botanical collection. Innumerable in this region were the plants with medicinal properties. The *sentori* (*centaurea*) for instance, plentiful there, with its sweetly pretty mauve flower, when boiled in water gave a bitter decoction good for fever.

We came upon a patch of *landir* or *landirana* trees, with luxuriant, dark green foliage. They grew near the water, and were by far the tallest and handsomest, cleanest-looking trees I had so far seen in Matto Grosso. They attained a great height, with extraordinarily dense

EXTRAORDINARY SCENERY

foliage, especially at the summit, but also lower down at the sides. Then burity palms were fairly abundant wherever one met *landir* trees in groups or tufts. We were now travelling at an elevation of 2,050 feet, then soon after at 2,100 feet above the sea level. There was merely stunted vegetation growing upon the red earth and sand.

On descending from that high point we came upon extraordinary scenery. To our right (north) was another concave depression with a further subsidence in its central part. Due west and northwest, from the spot where we first observed the scene, appeared four curious hemispherical domes forming a quadrangle with three less important ones beyond. In the southeasterly portion of the depression was a great rocky mass, while due north another, and higher, conical mount, much higher than all the others, could be observed.

In the eastern part of the depression a wide circle of big volcanic boulders — undoubtedly an extinct crater — was to be seen, with huge masses of spattered yellow lava in large blocks as well as ferruginous rock. That great depression, taken in its entirety, was subdivided into three distinct terraces, counting as third the summit of the plateau. A mighty, deep, impressive chasm, smothered in vegetation, could be observed within the central crater, in the northeast side of the circle.

The summit of the plateau, varying in elevation from 2,000 feet to 2,100 feet, on which we were travelling, was entirely covered by sand and grey ashes.

The valley in the depression extended in lovely campos from southwest to northeast — in fact, as far as the giant tableland which stood majestic in the distance.

The scene, as we stood on the edge of the plateau, was impressive in its grandeur, in its silence. In the morning the sky was almost entirely covered with the transparent clouds in scales like a fish. In the afternoon the

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sky above changed into horizontal layers of globular clouds, which stood as still as death. Leaden black, globular accumulations covered one third of the sky vault, great unshapen masses overhead rendering the air heavy.

We marched all that day on a deep layer of ashes. On descending from the plateau, we had on our left great clean campos and plentiful burity palms in a slight depression where moisture filtered through. As the caravan was moving along gaily, a *veado* (deer) gracefully leapt in front and, turning its head back two or three times to look at us, ran before us. Filippe, the negro, in his excitement, gave wild yells which set the mules stampeding, while green parrots in couples, scared at the sudden disturbance, flew overhead, adding piercing shrieks to the rapid tinkling of the mules' bells, the rattling of the baggage on the pack-saddles, and the shouts of the men trying to stop the excited mules. All those sudden noises mingled together were quite a change for us, accustomed to a constant deathly silence.

Before us on the west-northwest, as we still sank in grey ashes, were two conical hillocks. In the distance, to the west, two small, flat-topped plateaux rose above the sky-line, and also two hills shaped not unlike the backs of two whales. On our left we had an immense crack or fissure extending from northeast to southwest between the hill-range on which we travelled and another on the south, both showing huge domes of eruptive rock, apparently extensive flows of red lava subsequently blackened on the surface by weathering. On the opposite side to ours the rock was exposed all along the fissure for a great height, except the surface padding on the summit, where beautiful, fresh, green grass was in contrast to the deep tones of the rock. On our side we were still struggling in ashes and sand, with striated and much indented boulders of lava showing through.

We found many *sicupira* nuts, of a small, flat, and fat

GIANT DOMES OF ROCK

oval shape, and a yellow-ochre colour. The shell contained many tiny cells or chambers, just like the section of a beehive. Each chamber was full of a bitter oil, said to cure almost any complaint known.

On May twenty-second I took observations with the hypsometrical apparatus in order to obtain the correct elevation, and also as a check to the several aneroids I was using for differential altitudes. Water boiled at a temperature of 210° with a temperature of the atmosphere of 70° Fahrenheit. This would make the elevation at that spot 1,490 feet above the sea level. The aneroids registered 1,480 feet.

We came upon two strange rocks, one resembling the head and neck of a much-eroded sphinx, of natural formation, blackened, knobby, and with deep grooves; the other was not unlike a giant mushroom. The sphinx-like rock stood upon a pedestal also of rock in several strata. The head was resting on a stratum one foot thick, of a brilliant red, and at a slight dip. Under it was a white stratum much cracked, after which came a stratum of white and red, blending into each other. This stratum, two feet thick, showed the white more diffused in the upper part than the lower. The lowest stratum of all exposed was of a deep red.

Near this stood erect another columnar rock of a similar shape, the head and base entirely of red rock. It was eroded on the northwest side to such an extent that it was almost concave in the lower part. This rock, too, showed great cracks and a slight dip northwest in the strata. Vertical fissures were noticeable, and seemed caused by concussion.

A third rock, flat, with a convex bottom, stood as if on a pivot on the angular point of a pyramidal, larger rock, this larger rock in its turn resting over a huge base. There was no mistake as to how those two rocks had got there. They had fallen from above, one on the top of the

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other. A proof of this lay in the fact that they had arrived with such force that the base had split at the point of contact. As there was no hill above or near those rocks, there was little doubt that they had been flung there by volcanic action.

We were in a region of extraordinary interest and surprises. In the plain which extended before us, stood two conical hills in the far northwest, and three other hills, dome-like, each isolated, but in a most perfect alignment with the others, towards the east. Close to us were giant domes of rock, the surface of which formed marvellous geometrical designs of such regularity that had they been on a smaller scale, one might have suspected them of being the work of human beings; but they were not, as we shall see presently.

CHAPTER XVIII

THE SALESIAN FATHERS — A VOLCANIC ZONE

WE arrived at the chief colony of the Salesians, Sagrado Coração de Jesus (Tachos). There, thanks to the great kindness and hospitality of the Fathers, and also owing to the amount of interesting matter I found from a geological and anthropological point of view, I decided to halt for a day or two.

The Salesians had come to that spot, not by the way I had gone, but by an easier way via Buenos Aires and the Paraguay River, navigable as far as Cuyabá, the capital of Matto Grosso. The friars had done wonderful work in many parts of the State of Matto Grosso. In fact, what little good in the way of civilization had been done in that State had been done almost entirely by those monks. They had established an excellent college in Cuyabá, where all kinds of trades and professions were taught. In the port of Corumbá a similar school was established, and then there were the several colonies among the Indians, such as the Sagrado Coração de Jesus on the Rio Barreiro, the Immaculada Conceição on the Rio das Garças, the Sangradouro Colony, and the Palmeiras.

As in this work I have limited myself to write on things which have come directly under my observation, I shall not have an opportunity of speaking of the work of the Salesians at Cuyabá or Corumbá, two cities I did not visit, but I feel it my duty to say a few words on the work of sacrifice, love, and devotion performed by the friars in those remote regions.

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In the colony at Tachos, situated on a height, there were several neat buildings for the friars and a village for the Indians. What interested me most was to see how much of the land around had been converted with success to agricultural purposes. I inspected the buildings where useful trades were taught to the Indians of both sexes. Weaving-looms and spinning-wheels had been imported at great expense and endless trouble, as well as blacksmiths' and carpenters' tools of all kinds. A delightfully neat garden, with European flowers, was indeed a great joy to one's eyes, now unaccustomed to so gay and tidy a sight. What pleased me most of all was to notice how devoted to the Salesians the Indians were, and how happy and well cared for they seemed to be. They had the most humble reverence for the Fathers.

Padre Antonio Colbacchini, the Father Superior, an Italian, was an extremely intelligent and practical man, and one of the hardest workers I have ever met. With a great love for science, he had established a small observatory on a high hill at a considerable distance from the mission buildings. The abnegation with which Father Clemente Dorozeski, in charge of the instruments, would get up in the middle of the night and in all weathers to go and watch for the minimum temperature — their instruments were primitive, and they did not possess self-registering thermometers — was indeed more than praiseworthy.

My readers can easily imagine my surprise when one day Padre Colbacchini treated me, after dinner, to an orchestral concert of such operas as *Il Trovatore*, *Aida*, and the *Barbiere di Siviglia*, played on brass and stringed instruments by Indian boys. The Bororos showed great fondness for music, and readily learned to play any tune without knowing a single note of music. Naturally great patience was required on the part of the teacher in order to obtain a collective melody which would not seriously

VOLCANIC COUNTRY

impair the drum of one's ear. The result was truly marvellous. Brass instruments were preferred by the Indians. The trombone was the most loved of all. As the Indians all possessed powerful lungs, they were well suited to play wind instruments.

The colony was situated in one of the most picturesque spots of Matto Grosso. When out for a walk, I came upon a great natural wall of rock with immense spurs of lava, the surface of which was cut up into regular geometrical patterns, squares, and lozenges. I think that in that particular case the peculiarity was due to the lava having flowed over curved surfaces. On coming in contact with the atmosphere, it had cooled more rapidly on the upper face than the under, and in contracting quickly had split at regular intervals, thus forming the geometrical pattern.

We were undoubtedly in the former centre of inconceivable volcanic activity. In other parts of a great dome of rock I came upon strange holes in the rock, extremely common all over that region, which might at first glance be mistaken for depressions formed by glacial action, but which were not. They were merely moulds of highly ferruginous rock, granular on its surface and not smoothed, as one would expect in the walls of cavities made by the friction of revolving ice and rock. Nor did I ever find at the bottom of any of those pits, worn-down, smooth, spherical, or spheroid rocks, such as are usually found in pits of glacial formation. Those pits had been formed by lava and molten iron flowing around easily crumbled blocks of rock, or perhaps by large balls of erupted mud which had dropped on molten lava, that had then solidified round them, while the mud or soft rock had subsequently been dissolved by rain, leaving the mould intact. The latter theory would seem to me the more plausible, as many of those pits showed much indented, raised edges, as if splashing had taken place

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when the rock now forming the mould was in semi-liquid form. Only once or twice did I notice hollows with a suggestion of spiral grooves in their walls; but I think that those had been caused at a more recent date by water flowing in and describing a spiral as it travelled downward in the interior of the vessels.

On the hill where the observatory was situated, two circular volcanic vents were to be seen. The hill, which had a slope on one side, had evidently been split, as on reaching the top I found that an almost vertical precipice was on the other side. Quantities of quartz and crystals were to be found on that hill. All over that region quaintly-shaped rocks were also to be found, some like small cubic or rectangular boxes, others not unlike ink-stands, others in hollowed cylinders or spheres. Many, and those were the quaintest of all, were of a rectangular shape, which, when split, disclosed a rectangular hollow inside. These natural boxes were mostly of iron rock, laminated, which had evidently collected when in a liquid state round some soft matter, that had subsequently evaporated or disappeared with the intense heat, leaving empty spaces inside. The laminations were about one eighth of an inch thick.

Padre Colbacchini told me that some distance off a curious pool of water existed which he called the "electric spring." When you placed your hand in it you received a slight electric shock, while an impression similar to that of an electric current continued to be felt as long as you kept your hand in the water.

The mission buildings at Tachos were at an elevation of 1,600 feet, the observatory, 100 feet higher. The temperature on May twenty-third was maximum 81°, minimum 68.4° Fahrenheit. From the observatory hill an uncommon sight was before us. Seven large and small, isolated, conical and domed hills stood in perfect alignment from north-northeast to south-southwest in two different sets.

VOLCANIC ASHES AND RED SAND

In that region the prevalent wind was from the east-southeast during the months of May, June, July, and August. In September the wind veered gradually to the north and northeast; whereas, during the rainy season, winds from the north, northwest, and southeast were the most prevalent, especially the northwesterly wind. When the wind came from the north, it was generally accompanied by heavy rain. The rainy season in that particular zone of the immense Matto Grosso State extended from October to the end of April.

The Rio Barreiros flowed in a northerly direction (elevation 1,500 feet) over a bed of red lava, ashes, red earth, and sand. After leaving this river, we quickly rose again to an altitude of 1,700 feet upon a first hill, then to 1,800 feet on a second, and 1,850 feet on a third elevation over a great spur of red lava, extending in a graceful curve well into the valley below.

Exquisite was the view of the great plain below us, with its magnificent campos stretching as far as the eye could see, far away to the horizon line. In the far distance, scattered here and there, rose the peculiar, flat-topped, isolated mountains before described. Again all that day we marched over ashes, red sand, and volcanic débris. The highest point we reached was 1,950 feet. A snake dashed across our way among the hoofs of my mule, but no harm was done.

Near Camp Bugueirão (elevation 1,800 feet) where we halted, there was a delightful, clear, tiny spring emerging from white, volcanic, crystallized rock. Then more campos over lovely undulations in the country. Close by was what the Brazilians call a *furnas* (from the Latin *fornus*), a somewhat misapplied term by which they named any deep hollow or chasm, whether vertical like a precipice or horizontal such as a cave.

It was getting slightly less cold during the nights. On May twenty-fourth the Fahrenheit thermometer registered

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a minimum of 60° and a maximum temperature of 75° .

Owing to the usual trouble of recovering the mules in the morning, we only left camp at 10.30 a.m., rising over great masses of ferruginous rock, which showed through the deposits of ashes and sand at an elevation of 1,950 feet. The immense view of the campos in great undulations was really exquisite to the west and south-west.

My mules were then travelling over a strange, narrow strip of rock at a height of 2,050 feet—in some places only a few yards across—on the top of vertical walls dividing two deep valleys, one to the south, very extensive, with great lava-flows; another to the north. In the latter valley an immense, extinct crater was visible, in three well-defined, internal terraces and a deep, central depression.

Upon climbing on the summit of a high, conical hill, I further discovered that the crater had an elongated shape, the longest diameter being from north to south, the southern and lower part being overlapped by a voluminous flow of lava, which also covered a great part of the mountain slope. Strange monoliths were numerous, among the many fantastically shaped rocks, and also boulders lying about at all angles. One, like a huge table, rested on the top of another, upon which it had fallen with great force, as could be seen by the vertical splitting of the rock underneath. The rock above appeared simply broiled, and so were the huge masses of débris, especially of ferruginous rock, which had evidently been ejected by that crater. The entire summit of the crater cone (2,100 feet above sea level) was of hard black baked rock.

Close by, to the north, was another peculiar oval depression, the highest part of which to the northwest was in four distinct terraces in the interior. The eastern part was more flattened, not unlike a huge soup plate. In

LAVA-FLOWS

the centre was another deep depression, possibly an extinct crater, too. This second crater was to the north of the high-domed crater described above.

In the near west we had mere undulations over which we gradually travelled, but the country was getting much more disturbed than it had appeared since leaving the Araguaya River. Due west, farther away, stood a weird-looking plateau with a vertical high wall to the north. To the south it showed three terraces, the two lower ones supported on perpendicular cliffs, whereas a convex slope was between the second and third, or top terrace. To the southwest, in the far distance, another high plateau could be perceived, also with vertical cliffs to the north, but slanting at its southern end—a shape characteristic of nearly all the isolated mountains of that zone.

Looking south, we perceived great tongues of lava extending from east to west, the eastern point being higher than the western, showing that the lava had flowed there from east to west. Then there was also a great, sloping, grassy slant, possibly over another extensive lava-flow, from the crater we had examined. Extending toward the southwest was another tongue of lava of great width when measured from northwest to southeast, the latter (southeast) being its lowest point. On its northeast side this great flow had a high, vertical face. Between these enormous tongues of lava, east to west and southeast to northwest, was a depression or channel extending as far as a distant high dome, in three terraces to the southwest. On our course we came upon more curious, flattened, eruptive rocks, which had split, on falling with great force to earth, after having been ejected from a volcano.

Other parallel ranges could be clearly perceived. To bearings magnetic 160° were again to be seen our old friends, the two strange, gabled-roof and tower mountains.

ACROSS UNKNOWN SOUTH AMERICA

I climbed up on the Paredãozinho volcano (2,100 feet above the sea level) to examine its extinct crater, subdivided into two distinct, large craters and a subsidiary one.

One of these craters extended from east to west, and had in one section on its rim a giant dome split into quadrangular and lozenge-shaped sections, not unlike magnified mosaic work. Next to it was a great hill, with a vertical natural wall overlooking the crater itself. The horizontal strata of this natural wall, each about a foot thick, looked exactly like wonderful masonry work, so perfectly straight were the strata, and the square and rectangular rocks laid in lines with such extraordinary regularity. This wall stood upon solid masses of rock of immense size, hundreds of feet in height.

The lip of the crater on the south side was just like the well-laid pavement of a city, so regularly had the lava cracked in contracting, thus leaving four and five-sided geometrical figures, all well fitting in with their neighbours. Again, in this case, the lava, flowing over a convex surface, had contracted on the surface, and caused the wonderful network of grooves. In one section the crater had the appearance of an ancient Roman or Etruscan amphitheatre, with seats in many tiers or steps, separated by vertical cracks, as if cut out into separate blocks of stone.

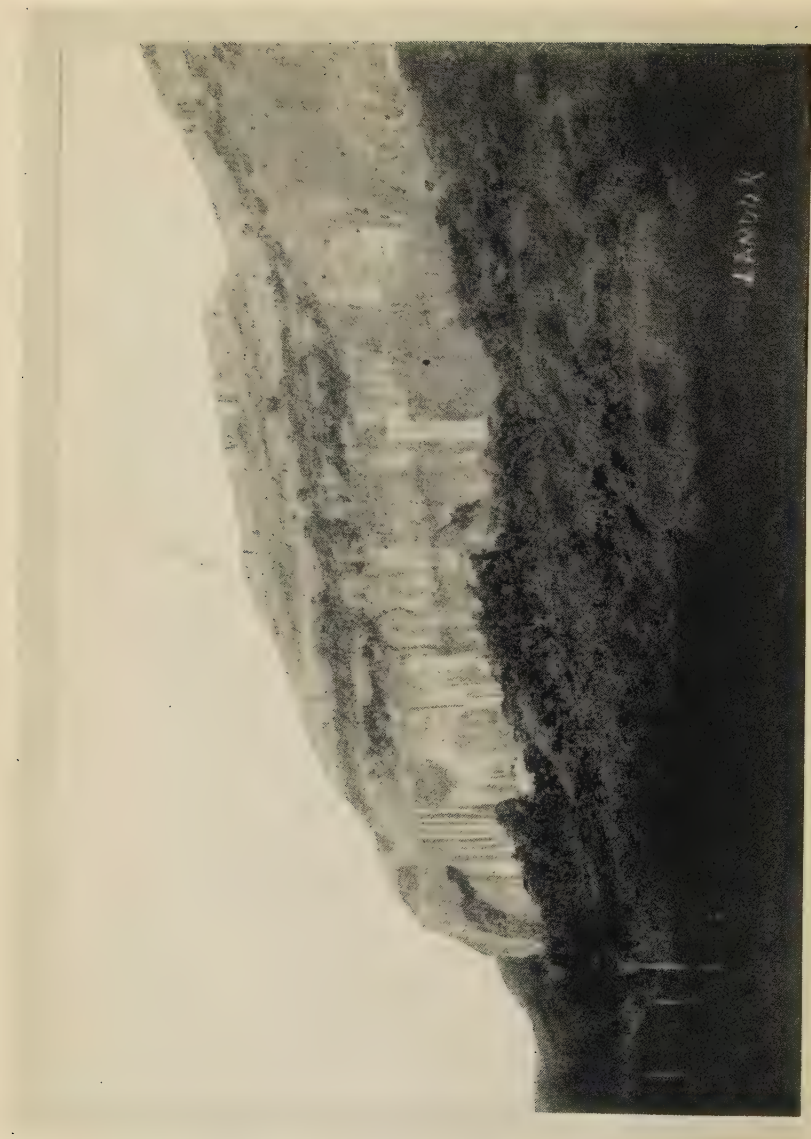
On the east side of the greatest portion of one crater, which would seem to have been the most active of all, I found again immense boulders with stratified rock above them resembling masonry work, just the same as and at the same elevation as the layers I had examined in the larger, elongated, horseshoe crater. In the centre of the smaller crater there flowed a rivulet of crystal-like water most delicious to drink. Undoubtedly those eastern rocks were the lip of the crater, for I discovered there two flows of lava in corrugations and network designs such as we



STRANGE FORMATION OF VOLCANIC ROCK.



VOLCANIC CAVITIES (MATTO GROSSO).



A VERTICAL MASS OF SOLID ROCK OF A BRILLIANT RED COLOUR.

A GREAT CRATER

had observed on the summit of the greater section. I had great difficulty in climbing up the steep, internal walls of the crater, and on the steep slopes with dried grass, which was slippery to a degree. On the top of the crater were great masses of carbonated rock; also patches of lapilli, and red and white sand, plentiful everywhere in that zone.

The smaller crater, it seemed to me, must have been a mere safety valve for the larger one. Its elevation, it will be noticed, was the same as that of the latter. From the summit of the one on which I was standing I could perceive the other to the east-northeast, forming the eastern boundary of this immense, volcanic hollow. The southern part of this great, double crater was subdivided into several sections, all in rocky terraces, quite vertical except in their lower portion, which was sloping and had evidently been filled to a great extent by an accumulation of ashes and erupted refuse. On the side on which I stood, however, the crater had not the diabolical, rather awe-inspiring appearance of the larger section of the huge, volcanic mouth, quite unscaleable by humans in its central section. In the deep cracks in the rock were several small grottoes. I experienced some difficulty and much fatigue in climbing to the top (elevation 1,750 feet) of the extinct volcano, and especially in reaching the lip of the crater, owing to the thick and much entangled scrub with innumerable thorns.

Our camp was at 1,500 feet, in a delightful spot at the junction of two streams, one from the south descending from the volcano, the other from the north. The two rivers united flowed north, I think eventually into the Rio das Mortes.

When we moved out of camp on May twenty-fifth (temperature, minimum 62°, maximum 80° Fahrenheit) I noticed that, after passing the wall-like section of the crater in the northern aspect, there were strata with a dip

ACROSS UNKNOWN SOUTH AMERICA

south in the inner part of the crater. The northern face of this vertical wall showed thick strata cracked into squares and rectangles with a dip in two different directions at an angle. There a draining channel had formed. Two rows of circular holes, like port-holes, were to be seen, one directly under the summit, the other one third down the cliff side. A giant, rectangular tower of solid rock stood erect, parallel to the great wall. Skirting this vertical wall, we travelled northwest-by-west, rising gradually to 1,800 feet on a deep layer of red, volcanic sand and grey ashes.

Looking back to the east, we had a complete view of the two-tiered plateaux with their vertical, northern walls, showing a dip south in their stratification. A crowning mound could also be observed surpassing their height, when we rose still higher to 1,900 feet on the summit of a ledge of cracked lava, with a slant westwards. On the eastern side, where it had crumbled owing to a subsidence, it showed a rounded moulding, whereas on the other side were great waves of lava. The lava had flowed from east to west.

After leaving this curious spot, we went over undulating red and ochre-coloured sand and more grey ashes. We rose twice to an elevation of 2,000 feet. We crossed a streamlet of delicious water flowing north over a red lava bed. Then more and more ashes were found all along. A second stream, also flowing north, was then negotiated, also over a red lava bed (elevation 1,800 feet), after which we climbed to 2,000 feet, descending soon after to 1,900 feet on the banks of another river flowing northeast.

At this spot were two more enormous lava-flows — one on each side of the stream, and extending in a tortuous course from southwest and northeast. The lava had flowed northeast.

On rising slowly in deep red sand to an elevation of 2,100 feet, we saw two prominent elevations of brilliant

TWIN PLATEAUX

red colouring to the south — they, too, with vertical cliffs to the north. To the west loomed two huge, twin plateaux, separated by an immense crack, also with vertical walls to the north and a slight dip south in the strata forming the various terraces.

CHAPTER XIX

THE PAREDÃO GRANDE — A CAÑON — A WEIRD PHENOMENON — TROUBLESOME INSECTS

WE had reached a spot of most amazing scenery — the Paredão Grande — a giant hill mass displaying a great crater in its north side. Two high cones stood above the immense, red-baked wall at its eastern end where huge blocks stratified in thicknesses varying from fifteen to twenty feet each. In that eastern section the strata were perfectly horizontal. On the western side of the crater was a colossal, quadrangular mountain of red-baked rock, a solid mass of granite with a narrow band, slightly discoloured, all along its summit. There — above — we also perceived a slight, grassy slope, and above it again a great natural wall in layers six feet thick. From the bottom of the mountain this upper natural wall resembled the defences of a great castle built on the summit of the giant rock. In approaching this strange sight we had gone over extensive deposits of ashes and yellow lava pellets and balls.

The elevation at the foot of this immense block was 1,970 feet, the summit of the rock 660 feet higher — so that the reader can easily imagine how impressive this quadrangular block of bright red rock was, several hundred yards in length on each side and 201 metres high.

As we reached camp rather early, I went to examine the block from all sides. On the southern side Alcides and I climbed up to within thirty feet of the summit, and from that high point obtained a stupendous panoramic



THE PAREDÃO GRANDE (MATTO-GROSSO).

PECULIAR FORMATION

view of the great expanse of undulating country to the south and southeast, while it was almost absolutely flat to the west as far as the horizon line.

To the southwest were distinguishable some extraordinary-looking, cylindrical tablelands, like immense sections of columns, rising well above the horizon line. To the south, in the distance, a peculiar formation of mountains could be seen: first a separate, prismatic mountain like a gabled roof, with a well-defined, vertical, high wall standing all along its longitudinal apex line. Parallel to this and to one another were three sets of mountains, with such steep sides that they seemed like gigantic walls standing up on the flat country. Behind them was a flat-topped plateau with a small cone rising above it. The sides of the latter plateau formed a steep escarpment. To the southeast was a domed plateau, red in its lower section, green on the top. Between this plateau and the last wall-like mountain, several hundred feet in height, stood a conical peak with a natural tower of rock upon it.

Beyond, to the southeast, could just be perceived two pyramidal mountains, but they were very distant and scarcely visible. The valley itself was greatly furrowed in deep, long channels. Due south were dome-like mounds—each of these, mind you, standing out individually upon an almost flat plain.

In the northwestern corners of the great, quadrangular, Paredão rock I saw a spot where it would have been quite easy to climb up to the summit, as portions of the rock had crumbled down and had left an incline. But I had no object in making the ascent on that side, especially as I had already obtained the view I required from the south side. Also because I was heavily laden, carrying cameras, aneroids, a large prismatic compass, and three heavy bags of money slung to the belt round my waist, and did not feel up to the extra and useless exertion. Great arches with a span of over eighty metres

ACROSS UNKNOWN SOUTH AMERICA

were to be seen in the lower part of the western wall. To the south there was a huge spur of lava with the geometrical pattern upon its surface we had already observed elsewhere. In this particular case, too, it appeared to me that the peculiar net of surface channels had been formed by coming in contact with the air, and not underground in the boiling cauldron of the volcano when the ebullition of the rock ceased. They were only found at a lower elevation because they had gone down with a great subsidence which had taken place, and in which neither the quadrangular Paredão Grande, nor the peculiar isolated mountains we had observed from its height, had been affected. They had remained standing when all the rest sank for some six hundred feet and, in places, more. That might perhaps account for the extraordinary shapes of all those mountains, which could not otherwise be explained.

At the foot of the vertical, giant block on the west, many domes of lava, channelled in a quadrangular network pattern, and ridges and cones, were found, all with a slope to the west. I had a great struggle in my research work that day, owing to the thick scrub with vicious thorns that tore one's clothes and skin mercilessly.

We came upon an immense deep crack in the earth surface — a regular cañon — which extended all along the centre of the great valley. On the opposite side of it were more big domes of lava in corrugated designs, also a gigantic, circular crater. Many natural crucibles of iron rock, some cylindrical in shape, others oval, others formed not unlike Pompeian lamps — while still others were square or rectangular or lozenge-shaped — were to be seen in many spots on the moraine-like tails that extended southward, like the tentacles of an octopus, and in the heaps of much carbonized rock and solidified froth produced by what was once boiling rock. The mounds of froth were usually collected in depressions.

A DEEP CANON

The west side of the Paredão was decidedly the most interesting of all. Its great arches showed that it must have once formed the sides of a great cauldron, the top of which had subsequently collapsed or been blown off. This seemed quite apparent from the discoloration in the rocky cliff some fifty feet above the arches, which followed the exact line of what must have been the thickness of the vault. The rock in that discoloured section was perfectly smooth, whereas above that it became much cracked vertically in layers, and gave the appearance of a masonry wall.

Toward the southwestern corner there was a prismatic tower. Where the peculiar, isolated rocks near the tower formed a spur, a dip was noticeable in the flow of the once molten rock, following what must have been at that time the surface soil over the cauldron's roof.

A huge, triangular crater could be seen, from which started an enormous crack of great length in the lava-flow of the valley to the west.

The southern face of that stupendous, rocky quadrangle was not quite so vertical as the west and north sides, and was more in tiers or steps of lava — but very steep indeed. It had in its lower part a great spur extending southward.

As I have said, Alcides and I arrived within thirty feet of the summit of the great Paredão, at an elevation of 2,550 feet, the summit being 2,580 feet; but owing to the last thirty feet being absolutely vertical and the top rock of a crumbling nature, and as my object in wishing to obtain a full view of the country to the south had been attained, I did not think it worth while to court an accident for nothing. It was well after sunset when we were up there, and it would take a long time to return to camp. So we hastened on our return journey.

The sunset that night, which we watched from that

ACROSS UNKNOWN SOUTH AMERICA

high point of vantage, was really too stupendous for words, and not unlike an aurora borealis — red, gold, and violet lines radiating from the sun like a gorgeous fan and expanding as they approached the summit of the sky vault. The descent was more difficult than the ascent, owing to the slippery nature of the rock.

At night, while back in camp, we saw to the west-northwest, quite low on the horizon, a brilliant planet — possibly Venus. The stars and planets appeared always wonderfully bright and extraordinarily large on fine nights. Whether it was an optical illusion or not I do not know, but a phenomenon, which lasted some hours, was seen by all my men, and appeared also when the planet was seen through a powerful hand telescope. It seemed to discharge powerful intermittent flashes, red and greenish, only toward the earth. Those flashes were similar to and more luminous than the tail of a small comet, and of course much shorter — perhaps four to five times the diameter of the planet in their entire length.

Whether this phenomenon was due to an actual astral disturbance, or to light-signalling to the earth or other planet, it would be difficult, in fact, impossible to ascertain, with the means I had at my command. Perhaps it was only an optical illusion caused by refraction and deflected rays of vision, owing to the effect upon the atmosphere of the heated rocky mass by our side and under us, such as is the case in effects of mirage. I am not prepared to express an opinion, and only state what my men and I saw, merely suggesting what seem to me the most plausible explanations.

At moments the planet seemed perfectly spherical, with a marvellously definite outline, and then the flashes were shot out especially to the right, as one looked at the planet, and downward slightly at an angle, not quite perpendicularly.

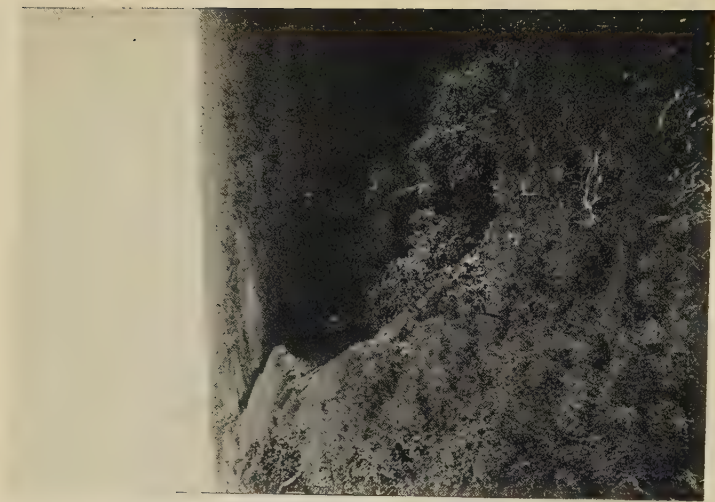
That night, May 25–26, was cold: minimum 58°



THE PAREDÃO GRANDE.
Showing vertical rocks with great arches.



MUSHROOM-SHAPED ROCKS OF VOLCANIC FORMATION.



A GREAT EARTHQUAKE FISSURE IN THE TERRESTRIAL CRUST (MATTO GROSSO).

A STRANGE PHENOMENON

Fahrenheit. But during the day, at nine a.m., the thermometer already registered 85° Fahrenheit.

The sky, half covered by flimsy, transparent mist to the east, and by globular, thin clouds, large overhead and of smaller dimensions to the west, developed later in the day into a charming mackerel sky, with two great arches of mist to the south, and delicate, horizontal layers of mist near the earth.

It was only when we were some distance off that we obtained a full and glorious view of the western side of the Paredão. The upper stratum showed a slight dip north, then there was a ledge on which grass seemed to flourish, and below it two parallel strata in a wavy line from north to south. Those two strata could be traced again, after a dip, in the range with two cones, separated, as we have seen, by a deep gap from the great wall-cliffs of the Paredão. The indication of what must have been once an enormous dome over a huge cavity or cauldron could be noticed in the western cliff, and also numerous chambers, large and small—at least, judging by the arches in great numbers noticeable in the wall. In other words, you had there the same effect as the one often seen in cities when houses are pulled down and the remains of the various rooms are visible on the remaining side walls.

Looking north as we left the disturbed region of the Paredão Grande, we came upon a great valley, with a depression in its centre. We were still travelling on volcanic, ochre-coloured sand in deep layers, especially as we rose to an altitude of 2,310 feet, overlooking a huge basin. We had then a good general view of the southern aspect of the Paredão Grande. In its side a huge gap with vertical walls—a vent perhaps—could be noticed, reaching as far as the summit of the mountain. It was interesting to note that all the great cracks in the earth's crust found in that region almost invariably had a direction from north to south, so that the ranges which

ACROSS UNKNOWN SOUTH AMERICA

remained bordering them must have split in a lateral movement east and west.

Six kilometres from camp, through the forest, we came upon some singularly delicious, green, smooth, grassy slopes. In other places were perfectly circular or oval, concave basins of volcanic ashes, in the centre of which stood charming groups of burity palms and trees with most luxuriant foliage. These *bosquets* existed in the hollow of all the basins where profuse infiltrations of moisture caused the luxuriant vegetation.

We were at an elevation of 2,350 feet. On going down to a stream (elevation 2,130 feet), we encountered great flows of lava. It had flowed in a westerly direction. We were proceeding through enchanting vegetation when we came to a second and a third *cuvette* or basin adorned with plentiful healthy palms in its central point.

As I was admiring the curious sight of these clusters of high vegetation absolutely surrounded by a wide band of lawn, such as one would see in a well-kept English park, a heavy and sudden storm arrived, which in a few seconds drenched us to the marrow of our bones. I have seldom seen or felt drops of water of such weight and size as when the rain began, followed within a few seconds by a down-pour in bucketsful.

Animals, baggage, and men, dripping all over, went along, rising to 2,400 feet above the sea level, by the side of a conical hill. A huge block of volcanic rock, shot and deposited there evidently from elsewhere, was to be seen near by.

Eighteen kilometres from our last camp we descended to a streamlet, dividing a grassy basin like the preceding ones. Again I noticed here that all divisions between ranges, caused by volcanic or other violent action, and not by erosion, were in a direction from north to south. We had this in the Paredão Grande, and in the triple division of the top-dyked mountains on the south, and also

PERSISTENT MOSQUITOES

in the gabled and tower mountains we had observed for some days to the southwest.

Again during the night I saw to the west the phenomenon of the previous evening repeated: the strange flashes directly under and occasionally to the left of the brilliant planet, that is to say to the right of the person observing it.

This was from Camp Areal, where we suffered terribly during the day from our friends the *pium*, which filled our eyes and ears and stung us all over; and at sunset from the *polvora* or *polvorinha* (or powder), so called because of their infinitesimal size: most persistent mosquitoes, so greedy that they preferred to be squashed rather than escape when they were sucking our blood on our hands and faces. Fortunately, during the night—with the cold (minimum Fahrenheit 56°)—we had a little respite, and these brutes disappeared, only to return to their attack at sunrise with the warmth of the sun. At nine a.m. the thermometer already registered a temperature of 95° Fahrenheit in the sun—a jump of 39° , which, notwithstanding mosquitoes and *pium*, my men greatly enjoyed.

I have never seen men suffer more from the cold than my followers. They were simply paralyzed and frozen at that comparatively high temperature. They moaned and groaned and wept all night, although they slept in their clothes and were tightly wrapped up in heavy blankets. Moreover, they had spread a heavy waterproof double tent over the lot of them, as they lay closely packed to one another, covering heads and all, and had arranged a blazing fire large enough to roast an ox quite close to them.

Personally, I was quite happy under a mere shelter tent, open on all sides, owing to preceding experiences, so that I could see what was going on all around, without getting up from my camp bed. I had merely a thin,

ACROSS UNKNOWN SOUTH AMERICA

camel's-hair blanket over me. I never slept in my clothes, preferring the comfort of ample silk pyjamas. In the morning I always indulged in my cold shower bath, two large buckets of water being poured by Alcides upon my head and back, amid the shivering yells of my trembling companions, who, at a distance, watched the operation, wrapped up to such an extent that merely their eyes were exposed.

"He is mad!" I often heard them murmur, with chattering teeth.

Beneath heavy, horizontal clouds low in the sky and ball-like cloudlets above, we started off once more from an elevation of 2,100 feet at the camp to proceed over a plateau 2,300 feet high and some six kilometres broad from east to west. Then we descended into another charming *cuvette* (elevation 2,100 feet), and farther on to a streamlet flowing north, the Rio Coriseo.

We were then travelling over reddish and ochre-coloured volcanic sand, going through stunted and fairly open *matto* (forest), higher up at 2,250 feet in successive undulations crossing our route at right angles. In one of the depressions (elevation 2,150 feet) was a river — the Rio Torresino — flowing north. Quantities of yellow, globular, lava pellets and lumpy blocks, evidently ejected by a volcano, were seen.

The stream Cabeça de Boi, forming after the Rio Macacos (or River of Monkeys) a tributary of the Rio das Mortes, into which flowed all the rivulets we had lately met, was next crossed (elevation 2,130 feet). Over more and deep beds of ashes we journeyed at 2,270 feet on the southern edge of a great grassy basin extending from east to west. Again a delightful group of palms and healthy trees was in the typical depression. Ant-hills were innumerable on all sides. One could not help admiring their architectural lines, which formed all kinds of miniature fortresses and castles. We were worried to

A DOUBLE-TOWERED MOUNTAIN

death by the *pium* or *lambe-olhos* (eye-lickers), as the Brazilians call them, which followed us all day in swarms around our heads and hands, entering our mouths, noses, eyes, and ears. Only for a few moments, when there blew a gust of wind, were we freed from this pest, but they soon returned to their attack with renewed vigour.

We rose again to an altitude of 2,380 feet on another great dome of red lava, which had flowed northwards, as could be plainly seen as we ascended on its rounded back. Upon it were quantities of crystals and yellow lava pellets and pebbles and carbonated rock, resting on whitish and grey ashes. On the summit, where, fully exposed, numerous perforations, cracks, and striations were visible in the flow, we were able to observe plainly how the lava in a liquid state had flowed and quickly cooled, while other strata of liquid lava flowed over it, one overlapping another like the scales of a fish, and forming so many oval or ovoid bosses with channels between.

From that high point we had a perfectly level skyline all around us, except for the Paredão Grande and the Paredãozinho, then to the east-northeast of us.

At an elevation of 2,520 feet we perceived that day to the east-southeast a double-towered, massive, rocky mountain of a brilliant red colour, reminding one of the shape of an Egyptian temple, and a lower hill range in undulations behind it to the south, projecting at its sides.

We were marching on the northern edge of deep and extensive depressions to the south and southeast of us. Domed undulations in progressive steps from north to south were noticeable in the southern portion of the landscape, and from south to north in the northern and much-wooded zone.

When we were at an elevation of 2,550 feet we had still red and yellow sand and ashes with stunted and sparse vegetation. Upon descending, we skirted the southern

ACROSS UNKNOWN SOUTH AMERICA

side of another peculiar oval basin — this time one which possessed a thin strip or row of tall vegetation in perfect alignment in the central line of depression. A deep deposit of grey ashes and sand encircled this *cuvette*. The general longitudinal direction of the oval was from the south, the highest point, to the north, the lowest of the rim.

Having travelled twenty-eight kilometres from Areal, we made camp on a streamlet flowing north.

The company of my men was a great trial to me, a penance I had to bear in silence. What was more, I could not let it appear in the slightest degree that it was a penance to me, if I did not wish to make matters worse. Pusillanimity and fear are two qualities which I cannot quite understand nor admit in men. Hence, it is well to be imagined what I suffered in being with followers who, with the exception of Alcides and Filippe the negro, were afraid of everything.

One of the men had a toothache. His last tooth in the lower jaw was so badly decayed that merely the outside shell remained. No doubt it gave him great pain. I offered to remove it for him, without a guarantee of painless extraction. The fear of greater pain than he endured, even for a few minutes, was too much for him. He would not hear of parting with what remained of the tooth. Result: for twelve consecutive days and nights that fellow cried and moaned incessantly, holding his jaw with both hands while riding a quiet mule, and sobbing *hai, hai, hai, hai!* all day long at each step of the animal — with variations of *hoi, hoi, hoi, hoi*, when the mule went a little quicker, and significant loud shrieks of *uppeppé, uppeppé, uppeppé*, when the animal began to trot, giving the rider an extra pang. That intense pain invariably stopped at meal-times, and it did not seem to have an appreciable effect on the man's ravenous appetite. My men never let a chance go by to let their companions share

MEAN IN THEIR NATURE

to the fullest extent in their sufferings. They had no consideration whatever for other people's feelings. In all the months they were with me they never once showed the slightest trace of thoughtfulness towards me, or indeed even towards any of their comrades.

Mean to an incredible degree in their nature — and I am certain no one could have been more generous than I was to them in every possible way — they believed that everything I did was due to a wish to save money. If I would not allow them to blaze away dozens of cartridges at a rock or a lizard — cartridges were a most expensive luxury in Central Brazil, and, what was more, could not be replaced — it was because I wished to economize. If one day I ate a smaller tin of sardines because I was not so hungry, remarks flew freely about that I was a miser; if I did not pitch a tent because I preferred, for many reasons, sleeping out in the open on fine nights, it was, according to them, because I wished to spare the tent to sell it again at a higher price when I returned home! They discussed these things in a high voice and in a most offensive way, making my hands itch on many occasions and my blood boil. But I had made up my mind that I would never lose my temper with them, nor my calm; and I never did, trying as it was to keep my promise.

With all this meanness of which they were accusing me, these poltroons were clothed in garments such as they had never before possessed in their lives; they were gorging themselves with food such as they had never dreamt of having in their homes, where they had lived like pariah dogs — and huge heaps were thrown daily to the dogs — and they were paid a salary five times higher than they could have possibly earned under Brazilian employers.

What annoyed me a great deal with these men was the really criminal way in which, notwithstanding my instructions, they always tried to smash my cameras and

ACROSS UNKNOWN SOUTH AMERICA

scientific instruments and to injure anything I possessed. Those men were vandals by nature. The more valuable an object was, the greater the pleasure they seemed to take in damaging it.

Thus another and unnecessary burden was placed upon me in order to save my instruments from destruction, not only from natural accidents but through the infamy of my followers. Those fellows seemed to take no pride in anything. Even the beautiful and expensive repeating rifles and automatic pistols I had given each man had been reduced to scrap-iron. Yet they were so scared of Indians that the first time we met some, they handed over to them anything that took their fancy — and which belonged to me, of course — for fear of incurring their ill-favour. During my absence from camp, they even gave away to the Indians a handsome dog I had, which I never was able to trace again.

Like all people with a dastardly nature, they could on no account speak the truth, even when it would have been to their advantage. They could never look you straight in the face. Hence, full of distrust for everybody, all the responsibility of every kind of work in connection with the expedition fell upon me. I not only had to do my own scientific work, but had to supervise in its minutest detail all the work done by them, all the time. It was indeed like travelling with a band of mischievous, demented people. The mental strain was considerable for me.

On that day's march we had passed two crosses erected, the Salesians had told me, on the spot where two men had been murdered by passing Brazilians — not by Indians. Their usual way of procedure was to shoot people in the back — never in front — or else when you were asleep. Nearly all carried a razor on their person, not to shave with, but in order to cut people's throats as a vengeance, or even under less provocation. This was

A TERRIBLE PACHYDERM

usually done in a quick way by severing the artery at the neck while the person to be killed was asleep.

The Brazilians of the interior were almost altogether the descendants of criminal Portuguese, who had been exiled to the country, and intermarried with the lowest possible class of African slaves. They seemed to feel strongly their inferiority when facing a European, and imagined, in which they were not far wrong, the contempt with which, although it was covered by the greatest politeness, one looked down upon them. That was perhaps the only excuse one could offer for their vile behaviour, which, according to their low mental qualities, they liked to display in order to prove their independence and superiority.

We made our camp in a heavenly spot, barring the devilish *borrachudo* (mosquitoes), on the bank of a crystal-like streamlet flowing north (elevation 2,200 feet). We were really fortunate to have excellent and plentiful water all the time. The thermometer went down during the night to a minimum of 54° Fahrenheit. There were more shivers and moans from my men. Only Alcides and Filipe behaved in a manly way. The others were in terror of attacks from the *onça pintada* (*felis onça*) or spotted jaguar of Brazil, and of the *terrivel tamanduas bandeira*, a toothless pachyderm, with a long and hairy tail, long nails, and powerful arms, the embrace of which is said to be sufficient to kill a man, or even a jaguar, so foolish as to endeavour wrestling with it. It had a long protruding nose or proboscis, which it inserted into ant-heaps. A tongue of abnormal length was further pushed out, and then quickly withdrawn, when crammed with attacking ants. Ants were its favourite food. Although my men talked all the time of the terrible *bandeiras*, we never had the good fortune to receive the fond embraces of one.

We had a beautiful sky — perfectly clear — on May

ACROSS UNKNOWN SOUTH AMERICA

twenty-eighth, except perhaps a faint curtain of mist near the horizon to the west. Two of my horses had unfortunately strayed; and as the men searched the *matto* with trembling knees in fear of meeting a *bandeira* instead of the missing horses, they were not recovered until late in the afternoon, so that we did not depart until four p.m.

We went up to the top of an undulation (elevation 2,400 feet), on grey ashes as usual in the lower part of the hill, and red volcanic sand on the summit. That afternoon's journey was not unlike tobogganing up and down all the time, at elevations varying from 2,500 to 2,350 feet, over domes of sand, ashes, and eruptive rock, and dykes with depressions, some 100 feet deep or so, and all extending from north to south.

We saw some gorgeous red *araras* or macaws of giant size. They were a beautiful sight as they flew, with their hoarse shrieks, above our heads.

At sunset we were travelling along the north edge of a great, grassy depression, wooded in its central pit, the line of depression and of the central vegetation being from north to south.

We were treated to a glorious sunset. The entire sky had become of a deep violet colour and Indian red, relieved here and there by golden tints, with blue cloudlets of wonderful regularity in a line. Curiously enough, the most brilliant colouring was to the east and not to the west, as would have been expected. Eventually the entire sky became of a glorious yellow, like a golden cupola, blending into a lovely emerald green in its highest point overhead.

Again we found ourselves on another large dome of eruptive rock, in some places reduced into fine, tobacco-coloured powder, getting somewhat darker in colour where the under stratum was of sand and soft conglomerate easily crumbled under pressure, and containing pellets of black ferruginous rock and grains of iron.



STRANGE GEOMETRICAL PATTERN OF LAVA OVER GIANT VOLCANIC DOME.



AUTHOR'S TROOP OF ANIMALS WADING ACROSS A SHALLOW STREAM.

SANGRADOR

Large blocks of iron rock were exposed to the air in many places.

We arrived at the third Salesian colony of St. José or Sangrador, near which was a small settlement of Brazilians — a bad lot indeed. One of my best horses was stolen here, and I was never able to recover it. I remained in that unpleasant place for three days, endeavouring to recover the animal, but it was of no avail.

The Salesians had a handsome property, the agricultural resources of which they were fast developing. Sugar-cane, mandioca, rice, beans, and Indian corn were raised with success. Father Antonio Malan, Inspector-General of the Salesians, arrived from the west, via Cuyabá. He was an extremely intelligent and enterprising man, who should be congratulated on selecting such excellent sites for the various colonies, as well as for the sensible, business-like fashion in which the colonies were conducted. They were indeed the only few bright spots where the light of civilization shone in those sadly abandoned regions.

Here are the meagre entries in my diary for the two following days:—

“May 29th. Remained at Sangrador in search of missing horse. Temperature: minimum 54° ; maximum 83° Fahrenheit. Perfectly clear sky.

“May 30th. Obligated to remain one more day at Sangrador. Horse missing still. All men have gone searching for it. Temperature: minimum $56\frac{1}{2}^{\circ}$ Fahrenheit; maximum 75° Fahrenheit. Elevation 2,050 feet.”

It was indeed a great treat to be able to converse with so intelligent a gentleman as Father Malan after the company I had been in since leaving Goyaz.

Father Malan was a man with a heart of gold and great courage. Under him the Salesians will some day continue their good work and spread happiness and culture among the few Indians who now remain in Matto

ACROSS UNKNOWN SOUTH AMERICA

Grosso. What had already been done by the Salesians was amazing. No doubt, with their great enterprise, they would certainly continue their good work of civilization and science combined.

Although the Salesians tried hard to induce men to accompany my expedition, their efforts were rewarded with no success; so that I had to be content with the handful of men I had with me. I foresaw disaster from that moment, for thirty was the least number of men I needed to carry out my work properly — and thirty good men at that. Instead, I had only six men, two of them extraordinarily plucky but quite uncontrollable; the others absolutely worthless.

Had I been a wise man I should have turned back. But I am not a wise man, and I never turn back; so that there only remained one thing to do — go on as best I could, come what might.

CHAPTER XX

WILD ANIMALS — AN IMMENSE CHASM — INTERESTING CLOUD EFFECTS

ON May thirty-first (thermometer: minimum 56° , maximum 74° Fahrenheit) I decided to abandon the missing horse and proceed on my journey. I suspected, with reason, that the animal had been stolen. It was no use wasting any more time searching for it. We thus bade good-bye for good to the Salesians, and left the great basin of the Sangrador River (elevation 2,050 feet).

We travelled over sparsely wooded country to 2,350 feet. Tobacco-coloured soil was still under our feet, yellow spattered lava, then again reddish soil, wonderfully rich and fertile, if only it could be cultivated. The country was here peculiar for its many undulations until we arrived on the rim of a large basin, extending from northwest to southeast, of great campos, with stunted vegetation at first, but later with a truly luxuriant growth of vigorous-looking *Jtauba preta* (*Oreodaphne Hookeriana* Meissn.), with thick, deep green foliage.

We crossed two streamlets flowing north. On going uphill we travelled on masses of volcanic pellets (elevation 2,500 feet). To the south we could see a number of hills, the sides of which showed the great effects of erosion by wind and water. Nearly all those hill ranges extended from east to west. A long depression could be observed, cutting them from north to south.

That was a fine day for cloud effects, especially along the horizon, where they displayed horizontal lines, while they had great, ball-like tops. Higher up, to the north-

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west, feathery mist turned the sky to a delicate pale blue. A heavy, immense stratum of cloud in four perfectly parallel terraces extended on the arc from west to north.

We descended into a *cuvette* with the usual cluster of vegetation in the centre and campos around. To the southwest of that *cuvette* was an elongated but well-rounded mountain, extending from east to west, and beyond, to the south-southwest, in the far distance, an almost identical replica of it. We travelled on deep volcanic sand on the west slope of the *cuvette* and in deep ashes at the bottom until we arrived at the Sangradorzinho River, flowing north.

June first (thermometer minimum $55\frac{1}{2}^{\circ}$ Fahrenheit; maximum 74° ; elevation 2,150 feet). Heavy mist and rain-clouds, heavy and sultry atmosphere. Sky almost entirely covered by clouds.

Owing to trouble among my followers and waiting for one of my men, who had remained behind in a last effort to find the missing horse, we were unable to leave camp until nearly noon. We rose to an elevation of 2,400 feet, leaving behind the great *cuvette*, and marching over parallel domes, extending from north to south. Between those domes in the depressions were sandy *cuvettes* of verdant grass and the usual central *bosquets*.

Cinders and sand were still plentiful, with stunted, thin trees growing upon them. Several times that day we reached an elevation of 2,550 feet. After passing a streamlet flowing north, we kept at that elevation for a considerable distance, after which, having descended 100 feet (2,450 feet), we found ourselves in a most enchanting, oval-shaped *cuvette* of cinders, well covered with fresh verdure, and in its centre from north to south a row of burity palms.

That was indeed a day of great surprises in the way of scenery. No sooner had we left that beautiful *cuvette* than we came to a magnificent, flat, open valley extending

NARROW ESCAPES

from east-southeast to west-northwest. In its northern part, where a pool of stagnant water was to be found, were innumerable burity palms. It was evident that during the rainy season that plain (elevation 2,350 feet) must be entirely under water. In many places it was swampy, even at the time of my visit. It was most refreshing to the eyes to see such expanses of green, healthy grass. The mules and horses enjoyed it more than we did, neighing to their hearts' content when we emerged into the great, verdant meadow. They tore with their teeth at the delicious grass as they cantered along gaily.

Some of the enjoyment of the delightful scenery was taken away from me — not only that day, but every day during almost an entire year — because of the stupid obstinacy of my men. They carried their magazine rifles fully loaded, eight cartridges in each, and while marching insisted on keeping the rifles cocked; they would not hear of keeping them at safety, so that any extra jerk or a twig of a tree catching the trigger might cause the weapons to go off at any moment. This would have mattered little if they had slung their rifles in the usual way, pointing skyward or else towards the earth. But no — one could never induce a Brazilian to do things in a sensible way. No, indeed; they must carry their rifles horizontally upon the shoulder, the muzzles of the nearest weapons always pointing at me. It was no use remonstrating, as they might perhaps have misunderstood it as fear. So all I could do was to trust in Providence. I could not have done better, for Providence indeed watched over me and protected me on that expedition in a most merciful way, for which I am truly grateful. On several occasions, as was to be expected from the careless way in which the weapons were carried, now one rifle then another went off unexpectedly, and I came mighty near being shot. On other occasions the mules had narrow escapes. Once a bullet went right through the hat of one of my men, just missing his head.

ACROSS UNKNOWN SOUTH AMERICA

In any case, I beg the reader to realize how pleasant it was to have the muzzle of a loaded rifle, ready to be fired, pointing at you in front for an average of eight to twelve hours a day for several months. I generally rode last in the caravan in order to prevent straggling, and also to see that any baggage which fell off the pack-saddles was recovered. This was unpleasant in more ways than one: first the clouds of dust raised by the animals, as we marched over the sand and cinders, filled my eyes, mouth, and nose; then the constant attention to watch for lost baggage, besides the work of writing my notes as we rode along. The sound of the dangling bells on the mules was monotonous to a degree, and so was the aspect of the animals' tails, swinging and slashing from one side to the other in order to drive away tormenting flies. Occasionally, when stung fiercely by a horse-fly, one or two animals would dash away wildly, tearing off in their career low branches of trees and even altogether knocking down good-sized trees, four or five inches in diameter.

This would seem impossible in any other country, but not in Brazil, where the majority of the trees were nearly entirely eaten up inside by ants. The roots, owing to the substratum of lava spread horizontally near the surface, offered little resistance to side pressure upon the tree itself, so that frequently even the weight of a man leaning against a tree was sufficient to knock it down. I never shall forget how impressed I was the first time I saw my men cut the way through the forest, slashing down, right and left, good-sized trees with one swing each of their *falcon*—heavy-bladed knives some two feet long.

What terrific strength! I thought, until I happened to lean against a tree, and down went the tree and myself too. Upon examination I found that merely the bark remained, with a few filaments inside, the rest of the interior having been entirely devoured by ants. Yet some

THE TREES OF MATTO GROSSO

of the top branches seemed still alive and had leaves. Again, even when quite sound, those trees were extremely anæmic and soft, quite watery inside, and could be cut almost as easily as celery.

This does not mean that all the trees of Brazil were worthless. No, indeed. These remarks apply merely to that particular portion of Brazil in which I was then travelling — where, barring the burity palms in the moist lands and marshes, the trees were mostly rickety and dwarfed, with mouldy barks, malformed limbs, and scanty leaves. That is why, when we came to the healthy mass of burity palms and the young grass, one felt just the same as when, after having been through a hospital, one emerges into the fresh air among healthy people.

That night we encamped on the heavenly meadow. We felt we had reached Paradise. For the first time great flocks of parrots and gorgeously coloured macaws played about and enlivened the air with their shrill whistles and shrieks, and flew over the palms, gently swung to and fro by the wind. Then innumerable *colibris* — the tiny humming-birds, of marvellous iridescent, metallic tints — sucked from one or another flower while still flying. Indeed, that spot seemed the rendezvous of all the animals of that region. There you found *onças* (jaguar), *anta* (a large pachyderm), the *Tapirus Americanus*, the *tamandua bandeira*, with its worm-like tongue (or *Myrmecophaga jubata*), and plenty of *veado* (*Cervus elaphus*). The footmarks of all those animals were innumerable near the water.

The man I had left behind in order to make a further attempt at recovering the lost horse arrived that evening, his search having been unsuccessful. Undoubtedly the horse had been stolen.

Although the place where we had made camp was a regular paradise to look at — in the daytime — it might have been compared to warmer regions at night. Mos-

ACROSS UNKNOWN SOUTH AMERICA

quitoes of all sizes and of all degrees of viciousness rose in swarms from the swamp at sunset, and made our life absolutely miserable. To counterbalance the torture we had a wonderful sunset to look at. First, the sky, of a golden colour, was intersected by graceful curves dividing it into sections like a melon; then it gradually became overlaid with horizontal black and crimson lines to the west, black to the east and overhead.

June the second was my birthday. I am superstitious by nature, and I would have given anything to celebrate it with some lucky event, although I was at a loss to think of anything lucky that could have happened to me there. Indeed, I began my new year badly, much worse even than I expected. That was an ill-omen to me. First of all there was a terrible row among my men in camp. They had taken to their rifles. They wanted to shoot the cook. The man deserved punishment, perhaps, but not quite so severe a one. After a great deal of arguing, I quieted them and got them to lay down their weapons. The cook's life was spared — worse luck for me. I was sorry for it when I had my breakfast, for cooking more diabolical than his could not be imagined. During breakfast the news came that another horse of my caravan had been lost. So there was the prospect of another day wasted to recover it. My men were unable to trace it, so I resigned myself to the monetary loss and also to the inconvenience its absence would cause us.

My men felt the cold intensely during the night, the thermometer being as low as 51° Fahrenheit (minimum). During the day the maximum temperature was 85° Fahrenheit and 96° in the sun.

My only consolation that day was watching the innumerable birds and gazing at the magnificent sunset. The latter consisted that evening of three lines forming arches — two black to the west and the third white — stretching across the sky from north to south. From the

BAD WATER

higher black line radiations spread, subdividing the sky into rectangular designs — of almost equal size. To the east were great globular masses of mist, somewhat confused in shape.

The water at this camp was bad, the marsh being over a bed of decayed vegetable matter, which rendered the water of a brownish black colour, like strong tea. Its taste was foul. By digging a well a few yards from the lagoon I succeeded, however, in obtaining clean and good water, which filtered through the ashes and sand.

Our camp was at an elevation of 2,300 feet. During the night, June 2-3, the thermometer was higher than usual (minimum 58° Fahrenheit), but my men felt the cold more than the previous night because of the heavy mist which set in after sunset, followed by a drizzling rain which damped everything. My men were all attacked by fever, which rendered them more irritable and ill-tempered than ever — if possible.

We did not leave camp until 11.30 a.m., rising again to the summit of the plateau some fifty feet higher. There we had to describe a wide arc of a circle, as through the trees we perceived on our left an immense chasm, beyond which was a much disturbed landscape of striking ruggedness. We could see a huge circular crater with eroded lips, rising like the chipped edges of a gigantic cup, in the centre of the great volcanic basin. That depression with high vertical walls all round displayed a large gap to the west-northwest, and another to the southwest.

Twelve kilometres from our last camp — and still marching along the edge of the circle on the summit of the plateau — we came to a grassy *cuvette*, and then to another hollow with a few burity palms. The wall overlooking the great circular depression was perpendicular, of red, igneous rock, with projecting spurs ending in conical, much-corrugated hills. The curious opening to the southwest was much broken up in two places with

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gaps. In the distance beyond were three ranges of hills, the colour of which appeared a pure cobalt blue.

The central crater was formed by rugged red walls with spurs on the east and southeast sides. In the bottom was water with trees all around its edge. There were four square holes from which boiling water gurgled like feeble geysers, and three more holes of a more irregular shape.

The hill range on which we stood projected well into the centre of the great, circular basin. It had on the west side perfectly vertical walls of black igneous rock. Its summit was chiefly formed of ferruginous, erupted rock thrown up while in a state of ebullition, which had cooled into a conglomerate of minute, globular masses, in shape like the bubbles of boiling water. The great circle around us, as we stood on the outermost point of the projecting spur, was most impressive, with its brilliantly coloured, red walls.

My men killed a *coatí* — a peculiar, long-nosed, carnivorous animal, which had characteristics in common with dogs, monkeys, and pigs. There were two kinds of *coatí* or *guatí*, viz. the *coatí de mundeó* (*Nasua solitaria*), and the *coatí de bando* (*Nasua socialis*). Ours was a *Nasua solitaria*. It was a beautiful little animal, about the size of a small cat, with a wonderfully soft brown coat on its back, a yellowish red belly and bright yellow chest and throat. The chin was as white as snow. The long tail, one and a half feet long, was in black and yellow rings. It possessed powerful fangs on both the upper and lower jaws, a long, black, gritty or granular tongue, short ears, powerful, short fore-paws with long nails — quite dog-like; long thighs, extremely strong, short hips and hind legs, with callosity up to the knee — evidently to allow that part of the leg to rest flat upon the ground. The *coatí* had velvety black eyes of great beauty, well set in its small, well-shaped head. It was a wild little fellow,

CABEÇEIRA KOITEH

extremely agile, and could kill a dog much larger than itself with comparative ease.

We circled the eastern and northern part of the great cauldron, always remaining on the summit of the plateau at elevations varying from 2,250 to 2,300 feet. We came upon patches of violet-coloured and then tobacco-coloured sand, and also upon quantities of dark brown sand, generally consolidated into easily friable rock. There were the usual deposits of grey ashes over the underlying volcanic rock which peeped through here and there.

On June fourth we were at the Cabeçeira Koiteh (temperature, minimum 53° Fahrenheit; maximum 80° Fahrenheit; elevation 2,100 feet). Close to this camp, from an outstretching spur, I obtained another magnificent view. To the east-southeast stretched from northeast to southwest a flat plateau, and to the east a flat, mountainous block with an eroded passage. Headlands branched off from the northern side of the ridges in a northeasterly direction. Between them were basins thickly wooded in their lower depressions. The northeastern portion of the flat range was almost vertical, with many angular and sharply pointed spurs projecting from it.

In the centre of the greater basin, of which the others were details, a low, convex ridge bulged out, with three conical peaks — two of them at the highest point of the curve. Between the first and second cone two twin sub-craters were visible — evidently the two twin circles had formed part of the same crater — in the mountain side of the distant range. A third crater was some distance off to the southwest.

To the southwest in the background was a fine view of flat highlands with huge, tower-like rocks standing upright upon them. Then to the south-southwest a regular, vertical dyke of rock stood on the top of an elongated, conical base.

The elevation on the summit of the spur from which

ACROSS UNKNOWN SOUTH AMERICA

we obtained this lovely panorama was 2,200 feet — or no more than 100 feet higher than our camp.

We travelled again that same day on the northern edge of the great depression, and met three more *cuvettes* of grey ashes with an abundant central growth of buritys. These were at a general elevation of 2,300 feet, the bottom of the depression being fifty feet lower. On descending from the tableland, through a gap we discerned far away to the south a long, flat-topped plateau extending from southwest to northeast and having a precipitous wall-face.

We got down to the Caxoeirinha stream, where we found an abandoned hut in the eroded hollow of the stream. The water flowed there over a bed of red lava and extremely hard, conglomerate rock made up of lava pebbles and solidified ashes. Above this at the sides of the stream was a stratum some ten feet thick of grey ashes, and above it a stratum two feet thick of red volcanic dust and sand.

As we got higher again and I stood on a projecting promontory, another wonderful view spread itself before me. The sun, nearly setting, in glorious white radiations, cast deep blue and violet-coloured shadows upon the great abyss to my right (northwest) which was a kilometre or more in diameter and more than 300 feet deep — surely another great crater. It seemed as if a natural wall of rock must have once existed, joining the promontory on which I stood to the great mass of prismatic, red, volcanic rock to the west of us, and ending in a flat triangle with a wide base. The surface soil on the height of the peninsula was of spattered lava and black, broiled rock and pellets.

The bottom of the abyss formed two sweeping undulations — the second from the centre much higher than the first — seemingly a great wave of lava vomited by the crater, by which probably the destruction of the wall joining the peninsula had been caused.

S. LOURENÇO RIVER

To the south-southeast in the distance stood a high mountain range, or rather a great flat-topped plateau of delicate, cobalt blue shades, almost losing itself in the sky. To the east, completing the circle, were two other great spurs of red-baked rock, with precipitous, almost vertical, sides and with much-striated buttresses that ended in conical mounds — eroded into that shape by the action of water and wind.

To the south, beyond, a sloping tableland with a pronounced dip eastward extended from east to west. It towered over everything, and was shaped like a trapezium. In front of this sloping tableland was another long, flat-topped range, stretching from east-southeast to west-northwest. Again in front of this could be seen an interesting series of prismatic mounds, like parallel barriers. To the south-southwest rose a large mountainous mass — another plateau. Then came a second range, cut into clear pyramids with rectangular bases, and, beyond, a great expanse of lovely green with some large mounds of a similar shape to those already described. Two more pyramids were also to be observed far, far in the distance, while others of a slightly less angular shape were noticeable upon the great flat stretch due west.

Right under us, at the bottom of the precipice, was thick forest covering, zigzag fashion, the two depressions, roughly in a general direction of southeast to northwest. Those two depressions drained that immense basin. It was there that the streamlet Caxoeirinha had its birth. The Caxoeirinha flowed northwest and fell into the Ponte de Pedra River, which flowed south. Those two streams, with a number of others, formed the head-waters of the great S. Lourenço River, a formidable tributary of the Rio Paraguay or Paraná.

An extraordinary effect of clouds could be seen that day, and a similar occurrence I saw on many other occasions upon the tablelands of Matto Grosso. The

ACROSS UNKNOWN SOUTH AMERICA

clouds reproduced, upside-down, the configuration of the country directly underneath them. That was due, no doubt, to the air currents diverted by the obstacles on the earth's surface, which caused the masses of mist above to assume similar forms — but of course, as I have said, upside-down.

We were still at an elevation of 2,150 feet. The temperature during the night went down to 52° Fahrenheit. My men, as usual, suffered intensely from the cold — at least, judging by the noise they made, the moans and groans and chattering of teeth. They nearly all had violent toothache. Alcides, too, apparently went through agony, but he showed a little more manliness than the rest and did not make quite such a pitiful exhibition of himself.

It was curious how certain racial characteristics were difficult to suppress in individuals. Alcides had some German blood in him — rather far removed. He could not speak German, nor did he know anything about Germany. Yet German characteristics came out in him constantly. For instance, the uncontrollable desire to write his own name and that of his lady-love on trees and rocks all along our passage. Alcides was really very good at calligraphy, and some of his inscriptions and ornamentations were real works of art. Many half-hours did we have to waste at the different camps, waiting for Alcides to finish up the record of his passage in that country, and many blades of penknives — I had a good supply of them to give as presents to natives — did he render useless in incising the lettering on the trees and stones.

Filippe the negro, who was the best-natured of the lot, had become quite swelled-headed with the big salary he received. Arithmetic was not his forte. As he could hardly write, he was trying to work out, with a number of sticks, each representing one day's salary, how much money he had already earned, and how much more he was

FILIPPE'S DREAM

likely to earn. It evidently seemed to him a large fortune — indeed it was — and his plans of what he would do with all that money in the future were amusing. First of all, the *idée fixe* in his mind was the purchase of a *mallettinha*, a small trunk with a strong lock, in which to keep his money and his clothes. I took advantage of this to tell Filippe — they were all just like spoiled children — that the best place for *mallettinhas* was Manaus, our chief objective on the river Amazon, some 1,800 kilometres away from that point as the crow flew, and at least about four times that distance by the way we should travel. Many times a day I had to repeat to Filippe glowing descriptions of the wonders of the *mallettinhas*, and I got him so enamoured of the *mallettinhas* to be got at Manaus that I made certain that Filippe at least would come along and not leave me. I was sure of one thing: that nowhere in the intervening country would he be able to procure himself a little trunk — nor, indeed, could one procure oneself anything else.

I supplied my men with ample tobacco. Filippe, all day and a great part of the night, was smoking a pipe. Owing to constant quarrels among my men, I had turned him into a cook. When in camp he had to sit hour after hour watching the boiling of the *feijao*. Enveloped in clouds of smoke, Filippe, with his pipe, sat in a reverie, dreaming about the *mallettinha*. He was quite a good fellow, and at any rate he did work when ordered.

All my men had been given small pocket mirrors — without which no Brazilian will travel anywhere. It was amusing to watch them, a hundred times a day, gazing at the reflection of their faces in the glasses. It was nevertheless somewhat trying to one's temper when one ordered a man to do something and then had to watch him for an endless time admiring his own features in the little mirror, and had to repeat the order half a dozen times before the glass was duly cleaned with his elbow

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or upon his trousers and put away, and the order carelessly obeyed. Even Alcides, who was far superior to the others in education, could not be kept away from his mirror. While riding he would all the time be gazing at his features instead of looking at the beautiful scenery around us.

On leaving camp we again reached the summit of the plateau (elevation 2,300 feet), with its patches of red, volcanic earth, violet-coloured sand, and snuff-coloured dust — extremely fine in quality. After crossing a streamlet flowing south, we again continued our journey on the flat plateau, slightly higher at that point, or 2,400 feet.

We were in the great plain crossed by the Ponte de Pedra rivulet, flowing southward. Once more we obtained a gorgeous view looking south. Four parallel ranges, stretching roughly from southeast to northwest, stood in all their grandeur before us. They were of brilliant red, volcanic rock. On the second range from us, rose a curious, square block of rock of gigantic size, resembling a castle with its door and all. In the distance, to the southwest, erosion seemed to have taken place on a great scale in the side of the tableland.

The highest point we had so far reached on the plateau on which we were travelling since leaving the Araguaya was 2,400 feet. There again we found another of the extensive grassy *cuvettes* — the flat bottom of which was only thirty feet lower than the highest point of the plateau. A luxuriant growth of burity palms and *birero* trees adorned the centre, the latter very tall and handsome, with smooth, white bark and only a dense tuft of dark green foliage at their tops. In the *cuvettes* I saw, the growth of the tall vegetation invariably ran the long way of the oval.

The sky that evening showed great streaks of transparent lines of mist from west to east, the central radiations of these being formed of lines so precisely parallel that they seemed to have been drawn with rule

THE SUNSETS IN BRAZIL

and dividers. Directly overhead those lines gradually blended into a more indefinite mass. The radiations did not begin from the vanishing sun on the horizon, nor at the point diametrically opposite on the east, but began to appear only one tenth up the entire circle of the sky, both west and east.

Almost globular cloudlets, with the lower section cut off in a horizontal plane — quite typical, as we have seen, of the cloud formation on that Central Brazil plateau — crowded the sky, quite low to the north, and also a great many small, ball-like clouds, which showed with some brilliancy against the blue sky.

The sunsets in Central Brazil were to me always a source of intense joy, interest, and admiration. With certain characteristics which repeated themselves frequently, they always displayed wonderful effects of light and a most peculiar formation of clouds.

Before reaching camp we passed another oval *cuvette* with a longitudinal row of trees, so green and tidy as to be just like a portion of a well-kept English park (elevation 2,350 feet). Another bit of wonderful scenery, with immense, prismatic, rocky mountains — really more like dykes — appeared in the distance; and also a vertical, walled mountain in the foreground.

CHAPTER XXI

A BEAUTIFUL LAGOON — STRANGE LUNAR DISPLAY — WAVES OF LAVA —
CURIOUS GROTTOS — ROCK CARVINGS — A BEAUTIFUL WATERFALL

WE camped at the Lagoa Formosa — or “ Beautiful Lagoon ” — a large, verdant, oval-shaped lagoon, entirely covered with grass, only 140 feet lower than the top of the plateau (elevation 2,290 feet). Barring a slight undulation in the land to the northeast of the marsh, the country was there absolutely flat.

At night I witnessed a marvellous lunar effect. The half-moon was high up in the sky. Soon after sunset two immense, concentric arches of mist, with their centres on the horizon to the east, shone like silver rings, their upper edges being lighted by the bluish light of the moon. With the reflection of this in the still waters of the lagoon, the effect was enchanting and intensely picturesque.

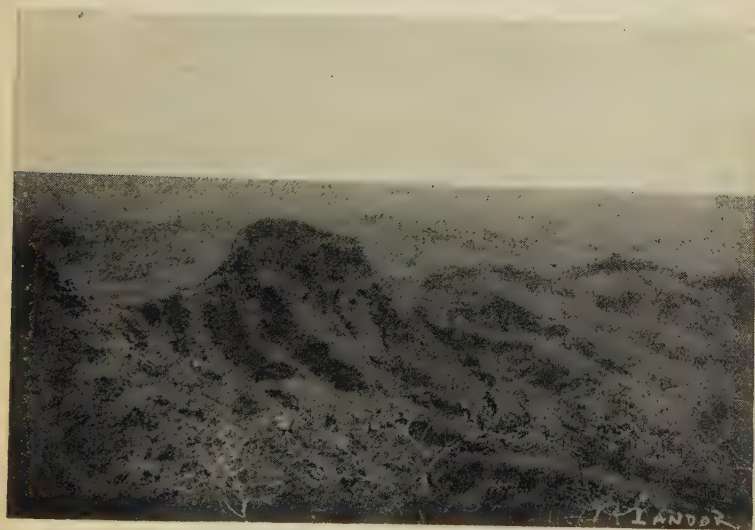
My men suffered a great deal from the damp — they were always suffering from everything: from the heat of the sun, the rain, the cold, the long marches.

That night we had a minimum temperature of 51° Fahrenheit, the elevation of our camp being 2,150 feet.

Naturally, over the expanse of water, the sunrise was wonderful. The sky was well covered by feathery radiations from the northeast, which were intersected by striations shooting skyward from east to west and forming a charming design. The radiations from the northeast reached right across the sky as far as the horizon to the southwest. What astonished me most in Matto Grosso was the characteristic immobility of the clouds. In the daytime they remained sometimes for hours with hardly



CENTRAL CLUSTER OF TREES AND PALMS IN CUVETTE
(MATTO GROSSO).



A GIANT WAVE OF LAVA.



STRANGE ROCK CARVINGS OF MATTO GROSSO.

GREAT SQUARE CASTLES OF ROCK

any changes or movement. As soon as the sun appeared, rendering the lower sky of a golden yellow and of vivid Indian red above, the northern part of the lagoon was enveloped in mist, which rose in angular blocks, vertical on the south side, slanting at a sharp angle on the north. These pointed peaks of mist remained immobile, as if they had been solid, until the sun was well up in the sky.

I went once more to gaze at the glorious panorama. In the morning light new and important details were revealed, such as a strange series of dykes of a prismatic shape, of which I could count as many as seven. Great transverse depressions or grooves from south-southeast to north-northwest, with a dip south-southeast could in that light be now plainly detected, and this time two great square castles of rock, instead of one, were disclosed upon the third range of undulations.

The high ridge to the southwest displayed a subsidence on a large scale in its central portion, where bare, vertical, red walls had been left standing on each side.

Then there were various other curious, concave depressions or gateways formed in the great tableland, which had for its marked characteristic concave curves on all its slopes.

On leaving camp — nearly at noon, after a serious quarrel and fight among my men, which left me worried to death by their petty nonsense and incessant grumbling — we journeyed at an elevation of 2,300 feet, finding shortly after an almost circular *cuvette* of deep grey cinders, 100 feet deep (elevation at the bottom 2,200 feet).

Twelve kilometres farther on we came upon another great depression extending from east to west, with an enormous belt of grassy land. There was the usual cluster of trees and palms in the centre, but larger than usual. To the south were campos, lovely prairies, with sparse and stunted trees — chiefly *Goma arabica* or acacias.

The elevation of the upper edge of the *cuvette* was

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2,500 feet, that of the bottom 2,450 feet. We continued our journey on the top of the plateau, with slight undulations varying in height from fifty to seventy feet. Snuff-coloured soil and red sand were invariably noticeable on the higher points, and grey ashes in the lower points, where erosion had caused depressions.

Then, farther on, the plateau, with an elevation of 2,450 feet, was absolutely flat for several kilometres, and showed sparse vegetation and miserable-looking anæmic trees, the thin soil over solid rock affording them inadequate nourishment.

Eighteen kilometres from our last camp we came upon another oval basin (elevation 2,400 feet above the sea level), extending longitudinally from north-northeast to south-southwest. On its huge deposits of cinders grew deliciously green, fresh-looking, healthy grass, and a thick clump of burity palms, and *birero* trees of immense height and thick foliage. Those beautiful trees were called by the people of Goyaz "*cutibá*" and "*pintahya*." They were marvellous in their wonderful alignment among the surrounding circle of gorgeous palms. The latter were in their turn screened in their lower part by a belt of low scrub, so that upon looking at that oasis one could hardly realize that it had not been geometrically laid out by the hands of a skilful gardener.

On the outer rim of the *cuvette*, away from the moisture, hundreds, in fact, thousands of cones, cylinders, and domes, from four to six feet high, the work of ants, could be seen, all constructed of bluish grey ashes.

We had here a wonderful example, quite sufficient to persuade the most sceptical, of the influence of agglomerations of trees in the formation of clouds. The sky was perfectly clear everywhere except directly above the extensive cluster of trees in the large *cuvette*. Quite low down, only a hundred feet or so above the top of the trees, hung a heavy white cloud. It was a windless day. The

A TRAGEDY SUGGESTED

cloud ended on all sides exactly where the trees ended, as sharply as if it had been cut with a knife. It looked exactly like a rectangular canopy over the luxuriant vegetation. This appearance was intensified by undulations in the lower part of the cloud, like festoons.

In proceeding across the immense circular *cuvette*, I found that the central line of thick vegetation formed an angle. A streamlet of delicious, crystal-like water emerged from among the trees. On its bank lay the skeletons of three mules, suggesting a tragedy.

On leaving the great *cuvette* we rose again to the top of the plateau, 2,550 feet above sea level. On descending from a large dome to the west over red volcanic sand and red earth, half consolidated into rock easily friable under slight pressure, we once more travelled across immense campos in a depression of fine cinders and earth, extending from north to south, at an elevation of 2,400 feet. We further traversed two other less important depressions, the deepest being at an elevation of 2,350 feet.

The jutting headlands of the plateau on which we had travelled were all most precipitous, nearly vertical, and of solid, dark red, volcanic rock.

A magnificent view next confronted us to the south. A huge, black, square block with a crater was before us, and there appeared what seemed to me to be the remaining sections of a huge volcanic vent and several smaller funnels. The lower lip of the crater formed a terrace. Then another wider crater could be perceived in a circular hollow of the spur of the plateau on which we had travelled, and which stretched out into the underlying plain. That spur extended from northeast to southwest, and in it two circular hollows of great size could be noticed, the sides of which were deeply fluted.

During the entire march that day we had seen quantities of violet-coloured deposits made up of tiny crystals, carbonized and pulverized rock, and ferruginous dust.

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On descending from the summit of the plateau, by a very steep slope, we saw many shrubs of *sapatinho*, a medicinal plant of the genus *euphorbiaceæ* (Euphorbia), growing in the interstices of red, igneous rock, and among débris of marble, crystals, and eruptive pebbles.

During the night we had a magnificent lunar display. There was a good deal of moisture in the air, and mist. First of all a gorgeous lunar halo was observed, which later vanished to leave room for a most extraordinary, geometrical design upon the partly moon-illuminated clouds and masses of mist. A most perfect, luminous, equilateral triangle appeared, with its apex downwards to the west and the half-moon in the central point of the base-line of the triangle above. On either side of the apex of the triangle faint concentric circles blended away into the sky near the horizon. Later in the night that curious effect disappeared, and a multiple lunar rainbow of amazing beauty and perfection was to be admired.

In ecstasy at the beautiful sight, and in a moment of forgetfulness, I drew the attention of my men to the wonderful spectacle.

“That’s the moon!” they answered, with a snarl. Talking among themselves, they contemptuously added: “*He* has never seen the moon before!” and they went on with the never-changing, blood-curdling tales of murders which filled them nightly with delight.

The streamlet flowing south, on the bank of which we camped, took its name of *Sapatinho* from the many *sapatinho* trees which were in the neighbourhood. It was a curious watercourse, which disappeared into a tunnel in the rock, to reappear only farther off out of a hole in a red lava-flow.

We had marched until late into the night, and it was not until we arrived and made camp that I noticed that Filippe the negro was missing. Several hours elapsed, and as he had not turned up, I feared that something had



WEIRD LUNAR EFFECT WITNESSED BY AUTHOR.

FILIPPE MISSING

happened to him. Had he been one of the other men I should have thought it a case of desertion; but Philippe was a good fellow, and I had felt from the beginning that he and Alcides would be the two faithful men on that expedition. I went back alone a mile or two in the moonlight to try and find him, but with no success.

At sunrise I ordered two men to go in search of him. The fellows, who had no mercy whatever even for one another, were loth to go back to look for their companion and his mount. When they eventually started they each took a pick to dig his grave in case they found him dead. Fortunately they had been gone from camp only a few minutes when I perceived Philippe riding down the steep incline.

The minimum temperature was only 55° Fahrenheit during the night, but it was so damp that my men felt the cold intensely, especially as there were gusts of a sharp breeze from the northeast. Moreover, in the deep hollow with thick grass in which we camped (elevation 2,200 feet above the sea level) we suffered absolute torture from the swarms of *carrapatos* of all sizes, mosquitoes, and flies. The air and earth were thick with them. The water was dirty and almost undrinkable, as it passed through a lot of decomposing vegetation.

I was glad when Philippe reappeared and we were able to leave that terrible spot. Great undulations were now met with, 300 feet and more in height.

Only one and a half kilometres farther on we came to the Presidente stream, flowing south (elevation 2,100 feet) over a bed of ashes, while its banks were formed of thick deposits of finely powdered, yellow, volcanic sand and dust.

We went over a huge dome covered with a stratum of brown sand, exposing on its western side a large wall of igneous rock with much-fissured strata dipping to the northwest. Immense, isolated rocks showed vertical

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strata, demonstrating plainly that they had been considerably disturbed at some epoch or other.

We were on the bank of another stream (elevation 1,950 feet) flowing south — the Capim Branco. We were then in another great and deep basin extending from northwest to southeast, in the northwestern part of which could be seen, on the summit of the rounded hill-tops and spurs, an overlapping of rock, evidently produced when in a molten condition. In the southwestern part of the slope encircling this great valley there stood another great barrier, formed also by a flow of molten rock curling over itself, as it were, and above this stood angular and pointed shoots of molten stuff of a subsequent origin. Large slabs of the latter could be separated easily from the underlying flow.

From the summit of that rocky prominence was obtained a lovely panorama of a great plateau, a portion of which had been eroded into a wall (east-northeast) with three buttresses: another portion was gradually assuming a similar shape. The plateau had a great spur projecting westward. A crater had formed with a broken-up side to the west, leaving the conical-shaped remains of its fragmentary mouth. The plateau ended after describing a sweeping curve — almost a semicircle.

In the centre of the immense basin before us were successions of high undulations, like great waves, extending southward in parallel lines (east to west). From the point of vantage on which I stood I could count as many as eight of those huge lines of waves. Evidently, at some remote period, it would be difficult to say how many thousands of years ago, that was a gigantic mass of molten stuff in commotion. In many places it was apparent that the great waves of molten rock had flowed over and partly overlapped the lower ones. In its higher, northeasterly point the basin was wooded.

The great basin extended southward. In that direction all the lower ridges with their arched backs showed a

GREAT WAVE OF MOLTEN MATTER

depression or dip. On the south-southwest two more great domes of wonderfully perfect curves were to be observed, and on the southwest stood an isolated, gigantic, quadrangular mountain of solid rock, with the usual buttresses in the lower portion typical of that region.

To the southeast a square-shaped plateau of marvelously graceful lines stood prominent in the centre of the basin. In the same direction, only a few hundred yards off, was a most peculiar, angular rock, which looked exactly like the magnified crest of an immense wave. That was just what it had been formerly: the wave, of course, of a gigantic, molten mass of rock, set in violent motion by an immeasurable force. It was the terminal point of the great succession of rocky waves which we had skirted to the north in order to arrive at that point, and which extended from the great semicircle we had passed the previous day.

At the terminal point of those rocky waves, or wherever the rock was exposed, it was evident that all those undulations had received a similar movement and had formed the great backbone range of rock, fully exposed in the last undulation. I had observed the continuation of this great rock crest the previous day in the basin previous to reaching the Capim Branco valley. There it crossed the spur on which I was — "Observation Spur," I shall call it for purposes of identification — almost at right angles. It seemed as if two forces had been acting simultaneously but in different directions, and at various points had come into conflict and eventually had overrun each other.

The last great, rocky crest at Capim Branco, when seen in profile, looked like a huge monolith with a slight inclination to the southeast. The formation of the rock itself showed a frothy appearance, such as is common with any liquefied matter while in a state of ebullition.

It is quite possible, too, that the great wave of molten matter travelling from northeast to southwest, upon

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encountering some obstacle, had its run interrupted and had cooled down, while its upper portion, from the impetus received, curled over the summit of the arrested, solidified rock below.

In fact, there was plenty of evidence to show that while the lower stratum cooled down, other sheets of lava flowed above it, forming many successive layers. In the eastern part, where they were at an angle of 40° , these had cracked considerably in cooling. The central part of the great wave was entirely made up of vertically fissured strata. The lower half of the mass of rock showed markedly that it was an anterior wave to the upper.

There was a wide gap formed by the volcanic crack between this and the continuation of the undulations to the southwest, which got lower and lower. Perhaps before the crack occurred that hill was like the others on the east and west of it, padded with red earth. It must have become barren by the great shock which caused the surface of the earth to divide, and which no doubt shook the surface deposits down. In examining its northeastern neighbour it could be seen that it actually tumbled over when the subsidence occurred, leaving a gap a few hundred metres wide.

A short distance beyond, on the south-southeast, was an interesting tableland sloping to the northeast, on the north side of which could be observed yet one more beautiful, semicircular, extinct crater. The rim, or lip of lava of this crater, had fissured in such a peculiar way as to give the appearance of a row of rectangular windows. The sections of the crater which remained standing showed two conical buttresses above massive cylindrical bases. From the crater started a huge, deep crack, 30 to 50 feet deep and 20 to 100 feet wide, which farther down became the actual bed of the stream. On both sides of this crack was a deep deposit of red earth and sand, the stratum below this being a solid mass of lava. The crater on the



A GIANT QUADRANGULAR BLOCK OF ROCK.



ROCK CARVINGS IN MATTO GROSSO.



A PICTURESQUE WATERFALL ON THE S. LOURENÇO.

ROCK-CARVINGS

northeast side of the mountain had an inclination to the north, but was quite vertical on the south side.

Beautiful crystals were to be found in abundance on this mound, as well as great quantities of marble chips and crystallized rock in various forms.

On the side of this strange mound of rock I found some curious, shallow caves, formed by great fissures in the rock. The vertical, outer walls of these caves were painted white with lime dissolved in water. There were some puzzling carvings, which interested me greatly. I could not quite make up my mind at first whether those carvings had been made by Indians, or whether they were the work of escaped negro slaves who had found shelter in those distant caves. In character they appeared to me Indian. Negroes, as a rule, are not much given to rock-carving in order to record thoughts or events. Moreover, those primitive carvings showed strong characteristics of hunting people, such as the Indians were. There were conventional attempts at designing human figures, both male and female, by mere lines such as a child would draw: one round dot for the head and one line each for the body, arms, and legs. Curiously enough—and this persuaded me that the drawings had been done by Indians—none of the figures possessed more than three fingers or toes to any extremity. As we have seen, the Indians cannot count beyond three, unlike members of most African tribes, who can all count at least up to five. This, nevertheless, did not apply to representations of footmarks, both human and animal, which were reproduced with admirable fidelity, I think because the actual footprints on the rock itself had been used as a guide before the carving had been made. I saw the representation of a human footmark, the left, with five toes, and the shape of the foot correctly drawn. Evidently the artist or a friend had stood on his right foot while applying the left to the side of the rock. When they attempted to draw

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a human foot on a scale smaller than nature, they limited themselves to carving two lines at a wide angle, to form the heel, and five dots to represent the toes.

The most wonderful of those rock carvings were the footprints of the jaguar (*onça*), reproduced with such perfection that it seemed almost as if they had been left there by the animal itself. Not so happy were the representations of human heads, one, evidently of an Indian chief, with an aureole of feathers, showing a painfully distorted vision on the part of the artist. The eyes were formed by two circles in poor alignment, the nose by a vertical line, and the mouth, not under but by the side of the nose, represented by two concentric curves.

A figure in a sitting posture was interesting enough, like a T upside down, with a globe for a head and a cross-bar for arms. The hands had three fingers each, but there were only two toes to each foot.

It was interesting to note how the sculptors of those images caught, in a rudimentary way, the character of the subjects represented. This was chiefly remarkable in the footprints of birds and other animals, such as deer. They seemed particularly fond of representing deer-horns, sometimes with double lines at an angle. That was possibly to commemorate hunting expeditions. A frequent subject of decoration was a crude representation of the female organ; and one, a magnified resemblance, angularly drawn, of an Indian male organ garbed in its typical decoration.

The face of the rock was absolutely covered with drawings, many being mere reproductions of the same design. Some were so rudimentary that they were absolutely impossible to identify. One fact was certain, that those carvings had been made by men who were trackers by nature and who observed chiefly what they noticed on the ground, instead of around and above them. Thus, there were no representations whatever of foliage or trees,

GEOMETRICAL DESIGNS

no attempts at reproducing birds, or the sun, the moon, the stars.

The most interesting of all, from an ethnological point of view, were the geometrical designs. They closely resembled the incised lines and punch-marks of the Australian aborigines, and the patterns common in Polynesia. Concentric circles, of more or less perfection, were common, some with a central cross of three and four parallel lines. Coils seemed beyond the drawing powers of Indian artists. Ovals, triangles, squares, the Egyptian cross (T-shaped), series of detached circles (these generally enclosed within a triangle, quadrangle, or lozenge) were frequent. Even more frequent were the parallel, incised lines, generally used as subsidiary filling or shading of other patterns, such as concentric circles, or sections of triangles or squares.

It may be noted that a certain intelligence was displayed by the artist in dividing circles fairly accurately into four and eight sections, the diameters intersecting pretty well in the centre of the circles. One pattern which seemed to take their fancy was that of an oval or a circle with a number of dots inside.

In examining the cave closely, inside and outside, I also found upon the wall, which was simply covered with those images, some curious marks resembling the letters H P, A P, and W , which seemed of a more recent date, perhaps left there by some missionary Father or native explorer, or by some escaped slave.

Just below the point where the stream Capim Branco entered the S. Lourenço River (elevation 1,800 feet above the sea level), there was a most beautiful waterfall — the Salto Floriano Peixoto. Two minor falls, some thirty feet high (Salto Benjamin), were also to be seen under arches of luxuriant vegetation, just above the point of junction of the two streams.

The roaring and foaming volume of water of the greater fall rolled over a vertical volcanic rock, about

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sixty feet high and sixty feet wide, with a small terrace half way up its face. The bed of the river below the fall was, like all the torrents of that region, of strangely shaped lava blocks. With the dense foliage, the innumerable *caité*, a medicinal plant with huge leaves, the festooned liane and creepers — all most verdant in the sombre green light filtering through the foliage and the moisture of the abundant spray from the fall — it was indeed a magnificent sight. In order to see it, however, one had to suffer a great deal, because in forcing one's way through the dense vegetation one got literally covered with *carrapatos* and *carrapatinhos*.

Above the falls, for some hundreds of yards, there were terrific rapids in the river, which flowed over a steep bed of yellow lava in terraces, over steps, and over a fourth minor fall some distance off.

DISTANCES FROM THE ARAGUAYA TO CAPIM BRANCO

	Kil.	Metres.
Araguaya to Ponte Alto	26	400
Ponte Alto to Fogaça	19	800
Fogaça to Prata	20	
Prata to Ponte Queimada	23	700
Ponte Queimada to Bella Vista	19	800
Bella Vista to Agua Quente	26	500
Agua Quente to Barreiros	10	
Barreiros to Agua Emeindada	16	500
Agua Emeindada to Tachos	29	700
Tachos to Bugueirão	20	
Bugueirão to Paredãozinho	20	
Paredãozinho to Paredão Grande	20	
Paredão Grande to Cabeça de Boi	33	100
Cabeça de Boi to Sangrador	33	100
Sangrador to Sangradorzinho	20	
Sangradorzinho to Varzen Grande	20	
Varzen Grande to Lagõa Secca	23	
Lagõa Secca to Caxoerinha	26	500
Caxoerinha to Ponte de Pedra	10	
Ponte de Pedra to Lagõa Formosa	20	
Lagõa Formosa to Xico Nunes	20	
Xico Nunes to Sapaturo	16	500
Sapaturo to Presidente	17	
Presidente to Capim Branco	14	850
Total	509	450

CHAPTER XXII

IN SEARCH OF THE HIGHEST POINT OF THE BRAZILIAN PLATEAU — MUTINY
— GREAT DOMES — TRAVELLING BY COMPASS — A GIGANTIC FISSURE
IN THE EARTH'S CRUST

I MADE up my mind that I would continue my journey westward no farther, and would now proceed due north in order to explore the most important part of the Central Plateau, the very heart of Brazil, precisely where the great rivers Xingu and Tapajoz had their birth. I believed that we should there find the highest point of the Central Brazilian Plateau. I expected to find in that region the most interesting portion of my journey from the geographical, anthropological, and geological points of view. I was greatly disappointed from the anthropological aspect, since I met no one at all; but from the geological and geographical I was certainly well repaid for my trouble, great as the trouble was. We had already ridden to a distance of 1,400 kilometres from the nearest railway.

My men mutinied on hearing of my plan, which I had kept concealed from them. They acted in a most abject manner. They tried to compel me to return the way we had come instead of going forward. As I flatly refused, they claimed their pay and wished to leave me there and then. Without an instant's hesitation they were handed their pay up to date and told they could go. The men had not quite realized that they would have to walk back some 858 kilometres to Goyaz, without food and without animals. Alcides and Filippe the negro had re-

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mained faithful, and on that occasion stood by my side. Unfortunately, Alcides, who had a most violent temper, quarrelled with Filippe over some paltry matter and drove him over to the inimical camp.

So there I was — with only one man left. I am not much given to losing heart over anything. Alcides showed a strong heart on that occasion. He and I proceeded for three days to rearrange the baggage and mend the saddles, etc., in order that we two alone might take along the entire caravan of animals. I did not at all look forward to the extra work of packing all the animals twice a day, and twice a day unpacking them. The loads weighed about fifty pounds each, and there were some thirty of them. Then we should have to hunt for the animals in the morning — a job which meant that one had to ride sometimes for miles to track them and bring them all back to camp. This prospect, on top of the work I had already in hand of writing, taking astronomical and meteorological observations, photography, developing negatives, drawing, collecting, and classifying botanical and geological specimens, which occupied all day and the greater part of the night, was a little too much for me. But such was my joy at having got rid of my unpleasant companions that I would have put up with any additional discomfort and inconvenience in order to get on. Alcides behaved splendidly on that occasion.

June eighth and ninth were absolutely wasted. The relief from the mental strain of constantly looking after — and being on my guard against — my companions was great. They were days of great happiness to me.

On June tenth Alcides and I were making ready to depart, with all the animals and baggage, when the four mutinous followers and Filippe the negro, most penitent, begged to be re-employed. Under ordinary circumstances I should certainly never have taken them back; but when one was hundreds of miles from everywhere, and had no

CAPIM BRANCO RIVER

possible way of finding a man, one had to be patient and make the best of what one could get. I gave them another chance, principally in order to save what I could of my baggage, most of which I was certain I should have had to abandon had I proceeded alone with Alcides.

The Capim Branco River was situated between two undulating ridges of lava.

I steered a course of 300° bearings magnetic (north-west), beginning a steep climb at once through the thin forest of the plateau to the north. In many places the mules slid and rolled down the precipitous slope of igneous rock and marble débris, scattering the packs in every direction. It was a wonder they were not killed. We urged the animals on, we pushed and pulled them, we held them with all our might by the bridles when they began to slide. After many narrow escapes we reached the summit—an immense, flat stretch of campos with stunted trees and delicious, crisp air—quite delightful after the stifling atmosphere of the Capim Branco basin. The elevation above the sea level was 2,300 feet. On the summit of the plateau was a deep stratum of red soil. Having marched across the entire width of the plateau, we found, on descending on the opposite side, another series of dome-like mounds of crimson, volcanic rock, with hardly any vegetation on them, joined together and forming many headlands, as it were. Beyond an empty space, an opening in the landscape, a great barrier crossed the range of domes almost at right angles.

We descended through thick undergrowth, under big *jatoba do matto* (*Hymenoclea Courbaril* L.) trees. The *jatoba* or *jatahy* wood has a high specific gravity, and is considered one of the woods with the highest resistance to disintegration in Brazil—as high as 1 kilogram 315 grams per square centimetre.

At 2,050 feet we found a streamlet flowing southward. We were then in a grassy basin—another *cuvette* with

ACROSS UNKNOWN SOUTH AMERICA

two central tufts of thickly packed trees. We were lucky enough to see some *coco babento* palms, from which we shook down dates which were excellent, although somewhat troublesome to eat, owing to the innumerable filaments protecting the central large stone. These filaments stuck between one's teeth, and were most difficult to remove. The dates were the size and shape of an ordinary English walnut and extremely oily.

It was a real joy to see fine, healthy trees again, after the miserable specimens we had seen of late. Even there, too, the powerful trees which emerged from the lower, entangled scrub and dense foliage were greatly contorted, as if they had gone through a terrific effort in order to push their way through to reach the light and air. Liane innumerable and of all sizes hung straight or festooned from the highest trees or coiled in a deadly embrace round their branches like snakes. Nor were they the only enemies of trees. Large swellings could be noticed around most of the trees, caused by the terrible *cupim* (*termes album*) or white ants, carrying out their destructive work just under the bark. Many indeed were the trees absolutely killed by those industrious little devils.

As we marched through the *matto*, using the large knives freely to open our way, we had to make great deviations in our course, now because of a giant *jatoba* lying dead upon the ground, then to give a wide berth to a group of graceful *akuri* palms, with their huge spiky leaves. Those palms had great bunches of fruit. We were beginning now to find trees with fanlike extensions at the roots and base, such as I had frequently met with in the forests of Mindanao Island (Philippine Archipelago), where they were called *caripapa* and *nonoko* trees. The *vines* or *liane* were getting interesting, some being of great length and of colossal size, twisted round like a ship's cable.

We rose again to an elevation of 2,600 feet. On

THE RIVER OF DEATH

emerging from the cool, dark forest and its refreshing, green light, we found ourselves on another plateau with a slightly arched summit of beautiful campos. From that height we looked over the immense, undulating plain to the south. To the southeast we gazed upon a lower, flat-topped plateau bounding the valley which, in great, sweeping undulations from southeast to northwest, resembled an ocean with waves of colossal magnitude. We travelled across the slightly domed, grassy plateau, and found on it a *cuvette* — only slightly depressed this time, but with the usual central line of tall trees with luxuriant foliage, burity palms and *pintahyba* trees. There, too, we had a surface stratum of red earth and fine, brown dust, with an under stratum of grey ashes. Soon after we came to a second *cuvette*, and farther north a third could be perceived. In fact, the summit of that particular tableland was made up of subsidiary domes dividing *cuvette* from *cuvette* in succession.

In going down to 2,550 feet we found a streamlet flowing northwest into the Rio das Mortes — or “River of Death.” We were then on the great divide between the waters flowing south into the S. Lourenço and eventually into the Paraná, and those flowing north, after thousands of kilometres, into the Amazon. This little rivulet was therefore interesting to me, for it was the first one I had met flowing north since leaving the Araguaya, although not the first whose waters eventually flowed in a circuitous way into the Amazon.

That was a day of great domes — all of them with perfect curves. On them the grazing was magnificent. To the north a wonderful, green dome, larger than the others (elevation 2,650 feet), would have been splendid for cattle raising. Not a sign of life could be seen anywhere. Seldom have I seen nature so still and devoid of animal life. What immensity of rich land wasted! It made one’s heart bleed to see it. There was everything

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there to make the fortunes of a hundred thousand farmers — yet there was not a soul! There was good grazing, plenty of water. There were no roads, no trails, it is true, but with a little enterprise it would be easy to make them. With a railway passing through, that now wasted land should become the richest on earth.

In a depression (elevation 2,450 feet) we came to a streamlet also flowing north, which had made the soil extremely swampy. We had endless trouble in getting across, the animals sinking and sticking in the black mud up to their necks. One of the mules, more reckless than the others, actually disappeared, baggage and all, while madly struggling to extricate itself from the sucking slush and mud. It took all our efforts combined to save that animal. By the time we had all got across, men, animals, and baggage were a sight worth looking at — all filthy, absolutely smothered in black mud.

We rose upon yet another dome and then descended to the Rio Manso or Rio das Mortes, the head-waters of which were not far from there, to the southwest, in the Serra da Chapada. The river was there only fifteen metres wide, but too deep and rapid for the animals to ford, so we had to follow its bank in order to find a suitable spot. The River das Mortes flowed, roughly, first in an easterly then in a northeasterly direction, and soon, swollen by innumerable streams, became the most powerful tributary of the Araguaya River, which it met almost opposite the centre of the great island of Bananal. In fact, one might almost consider the head-waters of the Rio das Mortes as the secondary sources of the great Araguaya. The Rio das Mortes flowed, at the particular spot where we met it, due north, along the edge of the great dome. The elevation of the top edge was 2,470 feet.

We camped that night on the Ribeirão do Boi, a swift torrent tributary of the Rio das Mortes (elevation 2,250 feet), having marched thirty kilometres that day. The

MARCHING TO SURE PERDITION

cold was relatively severe during the night, the thermometer registering a minimum of 48° Fahrenheit.

We were travelling entirely by prismatic compass. My men, who had no faith whatever in what they called the *agulha* (compass), swore that we were going to sure perdition.

"How can that *agulha*," said they, "possibly tell you where we can find beans (*feijao*), lard (*toucinho*), and sugar bricks (*rapadura*)?" "It is the invention of some madman!" said one. "It will bring us to our death," sadly reflected another. "If I had only known that we should be entrusting our lives all the time to that *agulha*," murmured a third, pointing contemptuously to the compass, "I should have never come. Oh, my poor mother and wife! And my dear little daughter six months old! Oh, shall I ever see them again! . . . shall I ever see them again?" Here followed a stream of bitter tears, wiped with the ragged sleeve of his shirt.

I thought that a cold bath would do them all good. I ordered them to take all the animals and baggage across the stream. It was a job of some difficulty, owing to the very swift current. A rough bridge had to be constructed over the most dangerous part. The water was freezingly cold.

On leaving the river we at once rose again over another great dome (elevation 2,350 feet), from which we obtained a most glorious view of other grassy domes, smooth-looking and well-rounded, with a fringe of forest in the depressions between. Down below we could see the Rio das Mortes we had left behind. It came at that spot from the southeast, and after describing an angle, turned to the northeast. From the northwest, at an elevation of 2,300 feet, descended the Taperinho, a small tributary which entered the Rio das Mortes.

We went over another domed mount, where I found a spring of most delicious water emerging in a gurgle

ACROSS UNKNOWN SOUTH AMERICA

from the very summit of the dome, at an elevation of 2,400 feet. On all sides we had beautiful, domed prominences with wonderful grazing land.

Alcides — careless, like all the others, with his rifle — was nearly killed that day. His rifle went off accidentally, and the bullet went right through the brim of his hat, just grazing his forehead. But we were accustomed to this sort of thing — it had happened so often — that I began to wonder when bullets would really wound or kill somebody. Indeed, we had a guardian angel over us.

We had descended into the belt of forest in the depression (elevation 2,270 feet), where a streamlet flowed to the northeast into the Rio das Mortes. We were travelling in a northeasterly direction, owing to the formation of the country; but finding that it would take me too much away from my intended course, I again altered our direction to a course due north. At an elevation of 2,480 feet we went over an extraordinary natural bridge of solidified ashes and earth, a regular tunnel, under which passed a streamlet of delicious water — the Puladó stream. The river emerged some distance off from under the tunnel. Curiously enough, while the vegetation was quite dense both above and below the natural bridge, there was no vegetation at all along the hundred metres forming the width of the bridge. Perhaps that was due to the lack of evaporation in that section, which supplied the trees elsewhere with moisture.

We rode over many domes of an elevation of 2,550 feet, and then over some that were smaller in diameter but of greater height. In the depressions between we invariably found rows of burity palms amidst other vegetation, and the characteristic, heavily foliaged trees.

We encamped near a delicious spring of water on the very summit of a dome. The water emerged from a circular hole and was warm — so much so that the next morning, when my Fahrenheit thermometer registered an

A THERMAL SPRING

atmospheric temperature of 50° , steam rose from the water of the spring. Around the spring a curious conical mound of finely powdered, white matter resembling kaolin had formed. This appeared to me to have formerly been a small geyser. The cone was broken on one side, and the water did not come out with great force. A few yards down the slope of the dome another similar white cone was to be seen, with a great mass of granular ash-pellets and tufa, such as are commonly found near geysers or thermal springs. We called that camp Cayambola.

On the night of June twelfth the minimum temperature was 50° Fahrenheit, the elevation 2,430 feet. The sky was somewhat clouded, the clouds occupying four tenths of the heavens. At sunrise we observed radiations in the sky, this time, curiously enough, from northeast to southwest, instead of from east to west. The longest and highest semicircle above us was in double filaments, and resembled an immense fish-bone.

We were supposed to be then in a country infested by cannibal Indians — swarms of them. My men were quite amusing in their fears. Four of them were troublesome and insisted on the whole expedition turning back in order to see them safely out of danger. I remembered on those occasions an old Italian proverb which said that to “women, lunatics, and children” the wisest thing is always to say “Yes.”

So when they threatened all kinds of things if we did not return I generally answered that we would continue a little farther, then we would see; and from day to day this went on, making forced marches forward all the time — generally of from thirty to forty-two kilometres daily. The dissatisfaction among my men grew, nevertheless, considerable, and a constant watch had to be kept over them. Alcides and Filippe the negro showed great courage, and, whatever other failings they may have had, they invariably displayed extraordinary bravery.

ACROSS UNKNOWN SOUTH AMERICA

Alcides' principal faults were his great wastefulness and violent temper and pride, which made it most difficult to deal with him. He had been entrusted with the commissariat, as with all my other occupations I could not be bothered to sort out and weigh the food for each man at each meal. Alcides would not understand that it was unwise, in a country where absolutely nothing was procurable, to throw away daily little mountains of rice and beans and preserved meat, after the men and our dogs had gorged themselves; and that perhaps it would lead some day to our dying of starvation. In confidence I had told him that we might be several months, perhaps a year, before we should be able to get fresh supplies. A little economy would perhaps save us all from disaster. I wanted everybody to have ample food, but I did not see the use of throwing away daily a larger quantity than the men actually ate. It was true that we still had ample provisions of all kinds for some eight months, but we must be prepared for all emergencies.

Alcides, who was extremely obstinate, would not hear of this. My remarks only made things worse. The waste from that day doubled, and looking ahead into the future, it really broke my heart, as I well saw that we should have hard times in front of us, all because of the lack of common-sense on the part of my followers.

On leaving camp we climbed to the summit of another gigantic dome of green pasture land (elevation 2,500 feet). We filled our lungs with the delicious air, slightly stirred by a fresh, northerly breeze. Geographically, we were at a most important site, for it was from that point that the division of waters took place between those flowing eastward into the Araguaya and those flowing westward into the Cuyabá River. So that within a distance of a few kilometres we had visited the region — the very heart of Brazil — from which the waters parted to flow toward three different points of the compass.

AN ENORMOUS PLATEAU

From that point we rose still higher to the summit of a great tableland, absolutely flat and waterless for over thirty kilometres. The soil was red in colour, with slippery dried grass upon it and sparse, stunted vegetation. The trees seldom reached a height of five feet. They were mostly *gomarabia* or *goma arabica*—a sickly looking acacia; *passanto*, with its huge leaves, *piqui* or *pequia* (*Aspidosperma sessiliflorum* and *eburneum* Fr. All.), the fibrous *piteira* or *poteira* (*Fourcroya gigantea* Vent.), and short *tocum* or *tucum* palms (*Astrocaryum tucuma* M.). Occasionally one saw a *passanto* tree slightly taller, perhaps some ten to twelve feet high, most anæmic looking.

After having travelled some twenty-four kilometres from our last camp we came to a great expanse of *taquary*, a kind of shrub three feet high with spiky leaves of a wonderful green colour.

We gazed upon the superb view of an enormous plateau to the west with deep indentations in its vertical sides. Huge spurs or rams of rock stretched out across the deep depression, separating the plateau to the west from the one on which we were standing. Both plateaux were of equal height, and had evidently at one time formed one immense, flat surface. On our side the plateau showed a huge slip of red, volcanic earth, with a lower stratum parallel to it of baked, brown rock. Under it were white lime and ashes, in sections or drifts. In the centre of the valley formed by the separation of the two sections there remained a formidable crater—extinct, of course—with an arc-shaped wall standing erect in its centre, and other lower walls forming an elongated, quadrangular channel from southeast to northwest in the bottom of the crater. Two conspicuous monoliths stood behind the huge lip of the crater to the southwest at the bottom of the valley, and also other remnants of the great convulsion of nature which had once taken place there.

ACROSS UNKNOWN SOUTH AMERICA

Notwithstanding the constant annoyance of my followers, I really enjoyed my journey over the central plateau. The air was fresh and deliciously crisp and clear. One could see for miles and miles and distinguish the smallest detail in the far-away mountain-sides, so pure was the atmosphere. This scene was unlike any in other countries. One could describe an entire circle around oneself, and nowhere did the eye meet a column of smoke rising above ground to indicate the presence of man. Not a bird was to be seen or heard, not a footprint upon the ground of any beast or creature of any kind. The silence of that land was most impressive. Our voices, as we spoke, sounded astonishingly and abnormally sonorous, in that region which for thousands of years had not been contaminated by sound. It seemed as if the sound-waves, undisturbed by the myriads of sounds which, as is well known, remain floating in the atmosphere in inhabited countries, were heard there in all their full and absolute purity. So much were we all impressed by this fact — my men unconsciously — that all the men began to sing, so pleased they seemed with the powerful vibration of their own voices.

To the northwest another lovely sight was before us: another huge plateau in dim greyish blue barred the horizon. In front of it was one more tableland, more broken up, and sloping on the south side.

When we reached the northeast edge of the plateau we were travelling upon, we were treated to a marvellous scene. Straight in front of us, on the opposite side of a deep depression, at 30° bearings magnetic, there stood one of the characteristic, two-tiered tablelands stretching from east to west. Below us in the depression was an undulating line from north to south of great bosses or domes of exquisite, grassy land, resting upon a kind of spur or peninsula jutting out from our plateau, but at a lower elevation, of which it formed part.

CHAIN OF DOMES

A formidable crack in the earth's surface extended from north to south on the east of the chain of domes, whereas to the east of the giant crack was another row of domed hills, forming, when taken as a mass, an undulating terrace; then a vertical wall, above which rested the sloping side of the plateau on which we stood. It may be observed that the strata in the split, vertical wall on our side was absolutely horizontal. On the summit of this rocky stratum lay a deposit, thirty feet thick, composed of red earth and sand over yellow sandstone and ashes, and, lower, grey ashes compressed and consolidated. The lowest stratum visible on the face of the wall was of bright, red-baked rock.

The great depression, taken in its entirety, extended from southeast to northwest. The huge crater was to the southeast. To the southwest there was an immense basin.

CHAPTER XXIII

THE JANGADA RIVER — DEMENTED DESCENDANTS OF SLAVES — APPALLING
DEGENERATION — GIANT MONOLITHS — THE RIVER RONCADOR —
GIGANTIC NATURAL GATEWAYS — THE DISCOVERY OF FOSSILS

WE had reached the end of the comparatively flat plateau, which varied in elevation on its summit from 2,530 feet to 2,570 feet above the sea level.

We were next faced by a precipitous descent in order to go down to the Jangada River, which eventually flowed into the distant Rio Cuyaba. There was, of course, no trail of any kind, and the course of the descent before us was not unlike trying to take our animals down the almost vertical wall of a fortress. With picks and spades we cut a narrow path for a short distance in order to start the reluctant beasts down. I recommended the greatest care to my men, but instead of following my instructions they drove the rebellious quadrupeds with their whips in a heap along the path, only a few inches wide, which we had cut. Result: Collisions among the animals and against the wall, and, next, five mules and baggage rolled down the mountain-side at a vertiginous speed until they had reached the bottom, some hundreds of feet below. Antonio, the strong man of the party, who tried to go to the rescue of one of the animals, was also dragged down, and came within an ace of losing his life. He was able to embrace a shrub with all his might just before rolling over the precipice, and we rescued him. We had to waste a great deal of time cutting an improvised way in the mountain-side. Then we had to unload all the animals and

A MELANCHOLY SPECTACLE

convey the loads down on men's heads. Each animal was then with great difficulty and danger led by hand down to the stream.

Great quantities of beautiful marble and crystals were met with, and masses of lava pellets and ferruginous rock. In the Jangada valley we found two hot springs emerging from the side of the plateau from which we had descended. I discovered there two miserable, tiny sheds belonging to a family of escaped negro slaves. They had lived seventeen years in that secluded spot. They grew enough Indian corn to support them. All the members of the family were pitifully deformed and demented. Seldom have I seen such miserable-looking specimens of humanity. One was demented to such an extent that it was impossible to get out of him more than a few disconnected groans. He spent most of his time crouched like an animal, and hardly seemed conscious of what took place round him. Another was a deaf and dumb cretin; a third possessed a monstrous hare-lip and a deformed jaw; while two women, dried up and skinny, and a child were badly affected by goître. For a single family that seemed a melancholy spectacle.

It was really pitiable, everywhere in the interior of Brazil, wherever you came across a family, to find that all its members were cretins, and deformed to such an extent as to make them absolutely repulsive. Frequently I had noticed among the common abnormalities supernumerary fingers and toes. One child at this place, in fact, had six toes to each foot, besides being an idiot, deaf and dumb, and affected by goître. The only one of the family who was able to realize what took place was terrified at our approach, and never got over his terror as long as we remained. He suffered from the illusion that everybody wished to murder him. For some reason or other he believed that I had come specially all the way from my own country in order to search for him and kill him. All

ACROSS UNKNOWN SOUTH AMERICA

the most considerate words on my part, the showering of presents, had no effect upon him. He sat some way off, watching me attentively all the time, and whenever I moved my hands in any direction he dashed away shrieking, thinking that I should attempt to strangle him, for his mania was death by strangulation. After a while he returned, and in his broken, almost unintelligible language — his tongue was nearly paralyzed and he had difficulty in articulating properly — begged to be spared.

Those people lived worse than animals, in an appallingly filthy condition, in two miserable, tumble-down sheds, open on all sides, and not more than eight feet high. They were reduced to that condition by intermarriage among themselves; brothers with sisters — a most frequent occurrence among the “civilized” of Central Brazil — and even fathers with daughters and sons with their mothers: a disgusting state of affairs which could not very well be helped in a race and in a climate where the animal qualities were extraordinarily developed while the mental were almost entirely deficient. Worse still, I have had several cases under observation in which the animal passions had not been limited to closely related human beings, but extended also to animals, principally dogs. The degeneration of those people was indeed beyond all conception. It was caused, first of all, by the effects of the most terrible corruption of their blood, their subsequent impoverishment of blood through intermarriage, the miserable, isolated existence which they led, with scarce and bad food, the exposure to all kinds of weather, and the absolute lack of thought, almost paralyzing the brain power. It was heart-rending to think that human beings could possibly degenerate to so low a level, and, what was worse, that beings of that kind were extraordinarily prolific; so that, instead of being exterminated, which would be a mercy for the country, they were in a small way on the increase.



A CANYON OF MATTO GROSSO.



HOW AUTHOR'S ANIMALS ROLLED DOWN TRAILLESS RAVINES.

MONOLITHIC ROCKS

I camped near the sheds of that "happy family," having gone forty-two kilometres from the Rio das Mortes. I felt sad the whole night, watching them unperceived. It upset me so that I was ill for several days.

The Rio Jangada, at an altitude of 1,550 feet, was 1,000 feet lower than the top of the plateau. The river flowed west into the Cuyabá River. We crossed the stream, a rapid and foaming torrent. We soon began to climb again on the opposite side over sweeping undulations. We waded through two more streamlets flowing west, the second at an elevation of 1,650 feet. We were travelling partly among campos on the summit of cones and domes, partly through brush or scrub in the depressions. We struggled on, urging the tired animals, rising gradually to 2,150 feet, then to 2,200 feet, over soil strewn with volcanic pebbles and scoriæ. During the night the minimum temperature had been 53° Fahrenheit, but during the day the sun was extremely hot and powerful, and animals and men were sweating freely. We marched northward, then slightly to the northwest, leaving behind, to the southwest of us, two quadrangular tablelands, rising above the undulating line of a depression.

Shortly after, to the east-northeast, we perceived the section of an extinct crater—the easterly point of its summit being in itself a semicircular subsidiary crater. On one side of the greater crater was a conical depression, at the bottom of which (elevation 2,400 feet), was an extensive bed of lava blocks of great size—hundreds of monolithic rocks standing up like pillars. In fact, they stood all along the side of the crater as well as inside it. Surrounding a pyramidal hill a group of those huge pillars looked, to a casual observer, just like the ruins of a tumble-down abbey.

Three hours' journey from our camp we reached the summit of a dome (elevation 2,500 feet). Beyond it was a *curvette* with its typical central line of burity palms.

ACROSS UNKNOWN SOUTH AMERICA

To the west we perceived a marvellous view of three immense dykes of red rock, like walls, stretching from southwest to northeast; then two more great perpendicular dykes of granite were disclosed close by.

Going over domes 2,550 feet and 2,450 feet above the sea level, we obtained a vast and immense view of the *serradão* (wild country) before us, a regular ocean of deep green undulations rising quite high to the south; whereas to the north there extended a long plateau, with a deep ravine on its southern aspect.

We descended through scrub (elevation 2,400 feet) — what the Brazilians call *serradão* — and through a growth of stunted trees (elevation 2,450 feet) to so low an altitude as 2,300 feet. Going along a rocky cliff, we passed a strange, volcanic vent-hole with a pyramid of granite of large proportions on each side of its aperture.

We arrived at the Roncador, a picturesque torrent flowing over a bed of lava moulded in the strangest possible shapes, hollows, terraces, and grottoes. Most peculiar were the great, concave hollows, circular, oval, and of irregular form, which were innumerable and of all sizes along that extensive flow of lava.

We had travelled thirty kilometres that day. That was such a picturesque spot that I made camp on the right bank of the torrent. We were all amazed to find an immense block of rock resembling in size and form the Sphinx of Egypt balanced to a nicety over the edge of a conical, rocky hill. It was, of course, the work of nature. Why that rock remained there at all and did not tumble down, was more than we could understand. There was also a giant monolith and other strange-looking rocks of great size standing up at all angles, close by. On climbing the hill where the Sphinx-like rock stood, I discovered a circular crater of great beauty, 300 metres in diameter. The western wall of the crater had been knocked down, but on the eastern inner side, in the central

A TERRACED WATERFALL

part, 150 feet high, there was a precipitous fall, then a huge, smooth, inclined plane of lava at an angle of 15° overlapping the top, where it had subsequently been subjected either to violent earthquake shocks or other disturbing influences, as it was badly seamed and fissured. Many segments had crumbled down, leaving the remaining portion of a most extraordinary shape. In the centre of the crater there stood a huge mass of rock 150 feet high, which looked like an inclined table — a giant slab cleanly cut at its angles, which protruded at great length outside the base formed by broken-up blocks. On looking west from the summit of the extinct volcano one obtained a marvellous view of the vertical cliffs between which the Roncador River flowed.

Then there was a great tableland extending from north to south, composed of red volcanic rock and white limestone. A separate, red, quadrangular, castle-like structure of immense proportions rose in the middle foreground in the northwest, upon a conical, green, grassy base.

Add to this wonderful work of Nature a magnificent sky of gold and brilliant vermilion, as limpid as limpid could be, and you will perhaps imagine why I could not move from the rock on which I sat gazing at that magnificent, almost awe-inspiring, spectacle. Night came on swiftly, as it always does in those latitudes, and I scrambled down the hill, among the sharp, cutting, slippery, shiny rocks, arriving in camp minus a good many patches of skin upon my shins and knuckles.

At the point where I crossed the Roncador River there were three handsome waterfalls in succession, the central one in two terraces, some ninety feet high. At the foot of the two-tiered waterfall was a huge, circular basin, which had all the appearance of having been formerly a volcanic vent. The flowing water, which tumbled down with terrific force, had further washed its periphery smooth.

ACROSS UNKNOWN SOUTH AMERICA

The centre of the basin was of immense depth. Directly under the fall a spacious grotto was to be seen under a huge projecting rock.

The elevation of the stream above the falls was 2,150 feet, below the falls 2,060 feet. The temperature of the atmosphere was 72° Fahrenheit, and the minimum temperature during the night 58° Fahrenheit.

The Roncador flowed from northeast to southwest as far as the foot of the great plateau we had observed during our march. There, on meeting the great vertical wall, its course was diverted in a northerly direction and then again to the northwest, where the stream eventually fell into the Cuyabá River. The Rio Jangada, on which we had camped the previous day, was a tributary of the Roncador, and so was the streamlet called Pedra Grande, which entered the Roncador on its right side. The Pedra Grande took its name from an immense monolith, worn quite smooth, near its bank.

From the Roncador we continued on our northerly course. The western view of the "balanced Sphinx boulder" was indeed remarkable. It seemed to stand upon a small pivot, despite all the laws of gravitation, the heaviest side of the upper rock projecting far out on one side with nothing to balance it on the other.

Cutting our way easily in the scrub, we rose to 2,300 feet over a flow of red lava (it had flowed in an easterly direction) in several successive strata. The upper stratum was grooved into geometrical patterns, such as we had met before, wherever it showed through the thin layer of red, volcanic sand which covered most of it. We were there in a zone of immense, natural pillars of rock, some of such great height that they were visible miles off along the range, which extended from south to north, parallel, in fact, to the course we were following.

Still proceeding due north, we arrived on the summit of a great dome, 2,500 feet, from which point we had to

SILENCE OF DEATH

alter our course to the northwest, owing to an isolated, impassable barrier which we left on our right (north). It had steep slopes but well-rounded, terminal points. It extended from north-northeast to south-southwest, and had a height of some 150 feet above the flat *serradão*, on which my skeleton-like mules wended their way among the stunted trees, the bells dangling from their necks monotonously tinkling — not the gay, brisk tinkling of animals full of life, as when we had left Goyaz, but the weak, mournful ding . . . ding . . . ding of tired, worn-out beasts, stumbling along anyhow. Occasionally one heard the crashing of broken branches or of trees collapsing at the collision with the packs, or the violent braying of the animals when stung in sensitive parts by an extra-violent fly; otherwise there was silence, the silence of death, all round us.

The poor brutes tore mouthfuls of grass, now on one side, then on the other, as they went along; but the grazing was poor in the *serradão*, and the animals found only enough to subsist upon. Two of them were absolutely disabled, owing to accidents we had had; and, with the animals I had lost, this involved loading extra heavily those still able to carry. The constant collisions against the stunted trees in that trailless region injured the animals considerably and caused nasty sores and swellings all over their bodies. I saw well that the poor beasts would not last much longer. It was impossible to halt a sufficient time to let them recover in that particular region, with food so scarce; it would have taken them months. In the meantime our provisions were being fast consumed, or rather wasted, and we had thousands of kilometres to go yet. My men never suspected this, or they never would have come on; but I knew only too well.

They still insisted on marching with their loaded rifles, fully cocked, resting horizontally upon their shoulders; and as we marched naturally in single file,

ACROSS UNKNOWN SOUTH AMERICA

and as we used cordite cartridges with bullets of high penetration, there was still a prospect of a bullet going through one or more of us. Once or twice again a rifle went off unexpectedly by accident. It would have been terrible for any one of a nervous temperament to be travelling with such companions. On previous expeditions I had generally trusted in myself, but on this particular one I was so disgusted that I had made up my mind to trust in Providence alone. I did well, for had I done otherwise I might have fared much worse than I did.

We went over a pass (elevation 2,400 feet) between two small domes, quite barren but for a scanty growth of short, dried grass. We were marching over masses of lava and conglomerate with innumerable, marble pellets. We found ourselves within a regular circle of low hills, enclosing a shallow depression. Subsequently we came to a second and then to a third similar depression.

Continuing in a northwesterly direction, we again obtained a gorgeous view of the treble *portal*, by which word the Brazilians describe a monumental entrance of any kind. That is just what those three immense gaps in the plateau looked like: an immense wall of rock forming a high barrier, with three gigantic, natural gateways.

After finding a stream of good water on the west side of the plateau, we rose again higher, obtaining a splendid bird's-eye view of the picturesque depression we had just crossed. The effects of erosion following those of volcanic activity were evident enough upon the entire landscape. On the west side we had a horseshoe-shaped, vertical wall, seemingly containing an extinct crater, and yet another on the north side of the western end of the elongated ellipse which was there formed.

With some difficulty we managed to get the animals up to the summit of the plateau (elevation 2,580 feet). From there we obtained a sumptuous view beyond. An immense dyke of brilliant red rock, flat-topped, lay majes-



HIDEOUS TYPES CHARACTERISTIC OF CENTRAL BRAZIL.
Two women (left), and two men (right).



AUTHOR'S CARAVAN MARCHING ACROSS TRAILLESS COUNTRY.



THE RONCADOR RIVER.

GIGANTIC FLAT TABLELANDS

tically to the west. At its foot the Rio Pedra Grande had its birth and then flowed westward into the Rio Roncador. Four gigantic flat tablelands stood impressively in a line. Three more, equally impressive, loomed in the southwest. Other minor ones, quite wall-like, rectangular in vertical section, appeared in the blue distance, while the horizon was barred by a long, flat plateau.

Looking north as we descended from the tableland, we found on our left another extinct crater, semicircular in shape, with several superimposed strata of lava, each about one foot thick, capping its lip, which was broken up into three sections. The valley below that crater formed a *cuvette*, the bottom of which (elevation 2,200 feet), showed deep erosion by water in one or two places. Sand covered the lava-flow, which had travelled northward. Quantities of heavy, spherical, bullet-like blocks of hard-baked rock were scattered all about, evidently shot out of the crater when active.

We had travelled eighty kilometres from Cayambola in three days, and we had reached a spot of slight, well-rounded undulations where grazing was fair. I decided to halt early in the afternoon, more particularly as this spot appeared to me to have been at one time or other submerged; probably it had been a lake bottom. I had, since the beginning of my journey, been searching everywhere for fossils, but in vain. I had not seen the vestiges of a single one. Personally, I was persuaded that Central Brazil could well be geologically classified in the archaic group, the most ancient of the terrestrial crust, and consisting (in Brazil) chiefly of gneiss, mica schists, and granite, solidified into their present form by intense eruptive phenomena and dissolved, not by immersion in ocean waters, as some suppose, but by deluges of such potentiality as the human mind can hardly conceive.

It was quite enough to visit the central plateau of

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Brazil to be persuaded that that continent had never been submerged under a sea; on the contrary, it must have been the oven of the world. The volcanic activity which must have taken place in that part of the world — it was not a separate continent in those days — was quite, as I have said, beyond human conception. This does not mean that at later periods there may not have been temporary lakes — as, for instance, in the spot where we encamped that night — or portions of country which had become flooded, upon the cooling of the earth, and subsequently became drained and dry again.

A wonderful surprise awaited me that day. To the north of my camp was a peculiar round mound. I climbed it, and what was my astonishment in the short ascent to find near the summit, among a lot of lava pellets, marble fragments, crystals, and great lumps of iron ore, a number of vertebræ from the tail and spine of a giant reptile! The vertebræ had been disjoined and scattered somewhat about by wind and water, but there they were: the smaller ones on the side of the hill, the larger on the summit, which led me to believe that the animal had crouched on the top of the hill when dying. Some of the fossil vertebræ were so large and heavy that I hardly had the strength to lift them up. The bones — petrified — were of a beautiful white. Many of them had, unfortunately, become so fractured as to make identification difficult. On following the line of the dorsal vertebræ, somewhat scattered about, I came upon some vertebræ which appeared to me to be cervical vertebræ; and then, behold my joy! in searching around the summit of the mound I perceived the skull. The skull was so big and heavy that I could not carry it away, but I took several photographs and careful drawings of it from all sides.

It was curiously shaped, quite unlike any other fossil skull I have seen. The cranial region proper was extremely short, with smallish, round orbits rather low down

PRE-HISTORIC SKULLS

on the side of the head. The skull had an elongated shape: thirty-five centimetres was its total length, ten centimetres its maximum transverse breadth, and five centimetres at the central and widest part of palate. The skull itself, with an elongated nasal bone, had a flattened point almost like a beak, or more probably like the base of a proboscis. The front part of the nose had unfortunately become fractured and ended with a flattened segment. A marked arch or hump stood prominent upon the nasal bone. The temporal arcades were quite developed, with prominent supra-orbital bosses. The orbital hollows were five and a half centimetres in diameter, whereas the external nares were nine and a half centimetres, the protrusion in front of the nostrils being ten centimetres long. The palate, of great length, had a peculiar complex shape, like a much-elongated U with another smaller U attached to it in the centre of its curve.

The skull had been worn down by age and weathering. Moreover, one side of the upper part of the cranium had been entirely destroyed, seemingly by having rested on red-hot lava. Many of the vertebræ were equally injured. By even a superficial examination it was easy to reconstruct the tragedy which had taken place on that hillock thousands upon thousands of years ago.

Searching about, I came upon the skull of another huge reptile, and a number of smaller vertebræ than those belonging to the animal above described. The second skull was much flattened, of an elongated shape, very broad, the orbital cavity being high up on the skull — in fact, not unlike the skull of a great serpent. It possessed a long, occipital spur, extraordinarily prominent, and fairly well-defined, zygomatic arches — but not quite so prominent as in the skull previously discovered. Seen from underneath, there seemed to be a circular cavity on the left front, as if it had contained a large fang. This skull, too, was also much damaged on one side, where it

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had rested on burning matter — evidently lava or lapilli. The skull measured longitudinally forty-eight centimetres and was twenty-three centimetres broad. Seen from underneath it resembled a much elongated lozenge.

Although I searched a great deal, I could not find the lower mandibles of these two skulls, nor loose teeth, but many indeed were the fossilized fragments of bones of other animals strewn all over the hill-top. I found up there quite a sufficient quantity to make the summit of that hill look of a whitish colour. That was why I had been attracted to it at first sight, and had climbed it in order to discover why it was so white. One immense bone, fractured, was the pelvis of the larger animal. Nearly all those fossils were in very poor preservation, much damaged by fire and water. Some were so eroded as to be quite unidentifiable.

Most interesting of all to me were two smaller skulls — one of a mammal not unlike a leopard or jaguar, the other of an ape or perhaps a primitive human being. The latter cranium, like all the others, had one side completely destroyed by hot lava, which in this instance had also filled up a considerable portion of the brain-case. The human skull was small and under-developed, no sutures showing; the forehead extremely low and slanting, almost flattened, with the superciliary region and glabella very prominent. One of the orbits (the right) was badly damaged. The left, in perfect preservation, was oval, very deep. The form of the palate was of a broad U-shape, abnormally broad for the size of the head. The upper jaw was fairly high and prominent, whereas the zygomatic arch on the left (the right was destroyed) was not unduly prominent, in fact, rather small and less projecting than the supra-orbital region. Of the nasal bone only just a fragment remained. The brain-case was small but well-rounded at the back, where it had comparatively a fairly good breadth behind the auditory meatus.

DERISION

In my anxiety and enthusiasm, I used up, in photographing the first skull I found, the only two photographic plates which remained in the camera I had brought with me up there. In order to obtain a fuller view of the skull on the negatives, I placed it on a rudimentary stand I constructed with broken branches of a tree. The sun had already set when I discovered the two smaller skulls, and in any case I should not have been able to photograph them that day. Well recognizing their immense value, I enveloped them in my coat, which I turned into a kind of sack by tying the sleeves together, and, with a number of vertebræ and a knee-joint I had collected, proceeded to carry the entire load, weighing some sixty pounds, back to camp, a mile away.

On my arrival there I met with a good deal of derision from my ignorant men. I was faced with a problem. Had I told the men the immense value of those fossils, I feared they might be tempted to steal them and sell them whenever we first reached a civilized spot — which, true enough, might not be for many months; a fact my men did not know and never for one moment realized. If I did not tell them, I should have to stand their silly derision as long as the journey should last, for they openly and loudly argued among themselves the view that I had gone mad, and what better proof could they have than my carrying a heavy load of “ugly stones” as my personal baggage?

Of the two I came to the conclusion that derision was better than being robbed. So I took no one into my confidence. I merely stored the fossils carefully away in a large leather case, meaning to take them out some day to photograph them as a precaution in case of loss. Unfortunately the opportunity never offered itself, for we made forced marches every day, from early morning until dark, and unpacking and repacking was very inconvenient, each package having loops of rope fastened round, in order to

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be readily attached to the saddles, which took much time and trouble to undo. Then the ridicule of my men each time the "ugly stones" were referred to also kept me at first from unduly attracting their attention to them. With the many things I had to occupy my time day and night I ended by forgetting to take the photographs — greatly owing to being almost certain that I should bring the skulls themselves safely back to Europe. But the unexpected always happens. We shall see later on how, after having carried those fossils safely for several months, they were, unknown to me, wilfully flung, together with a quantity of provisions, into a deep part of the Arinos River by my companions, and they were beyond recovery.

Greatly to my regret, we left that interesting spot the next morning. A drenching rain prevented my paying a second visit to the two hillocks where the fossil fragments were to be found, but I took the exact position of them, so that any further expedition could locate the spot with great ease.

It was interesting to note that a Brazilian expedition had discovered some fossil bones of a gigantic animal some 200 kilometres southwest of that place, and other remains of a giant animal had been found by another Brazilian expedition on the banks of the Paranatinga River, some 400 or 500 kilometres northeast of our position.

We were encamped on the bank of the Rio Pedra Grande, the stream of that name which we had passed that day being merely a tributary. During the night we had observed a double-ringed, lunar halo. The moon was almost full. From the horizon directly under the moon were innumerable radiations, not converging toward the moon but, curiously enough, the first two at a tangent to the larger halo, the others at equal intervals on each side.

At sunrise, before the rain-storm began, we were treated to wonderful cloud and light effects. The lower portion of the sky, of brilliant yellow and vivid green,

A HEAVY DOWNPOUR

was surmounted by golden and red streaks of wonderful vividness. Later, over the great natural gateways, the sky formed itself into concentric arches of blazing yellow and red, rendered intensely luminous by contrast with the heavy, black clouds which were fast collecting overhead. No sooner was the sun well above the horizon than we came in for a heavy downpour.

The temperature had been higher (minimum 60° Fahrenheit) than usual during the night, and heavy. The elevation of our camp was 2,030 feet above the sea level.

CHAPTER XXIV

A SWAMPY VALLEY — IMPRESSIVE SCENERY — "CHURCH ROCK" — ESCAPING BEFORE A FOREST FIRE — THE RIO MANSO — DIFFICULTIES OF MARCHING ACROSS VIRGIN COUNTRY — BEAUTIFUL RAPIDS

ON leaving camp (June fifteenth) I noticed that the hills on which I had found the fossils formed a semi-circle to the west. Rising quickly to an elevation of 2,070 feet, we were in sight of two great tablelands which stood to the west. In crossing the river I found a number of other fossils, among which was one that appeared to be the petrified foot of an animal of enormous proportions.

We soon crossed the little stream Lazineha, which flowed into the Pedra Grande. As we travelled over two ridges (altitude 2,100 feet and 2,130 feet) separating deep basins, and the weather cleared a little, the view before us of the entire line of natural gateways, with two additional pyramidal and prismatic peaks to the south, became more and more beautiful. There was a strong breeze blowing from the northeast. At an elevation of 2,150 feet we found quantities of marble chips and blocks and great masses of ferruginous, froth-like rock.

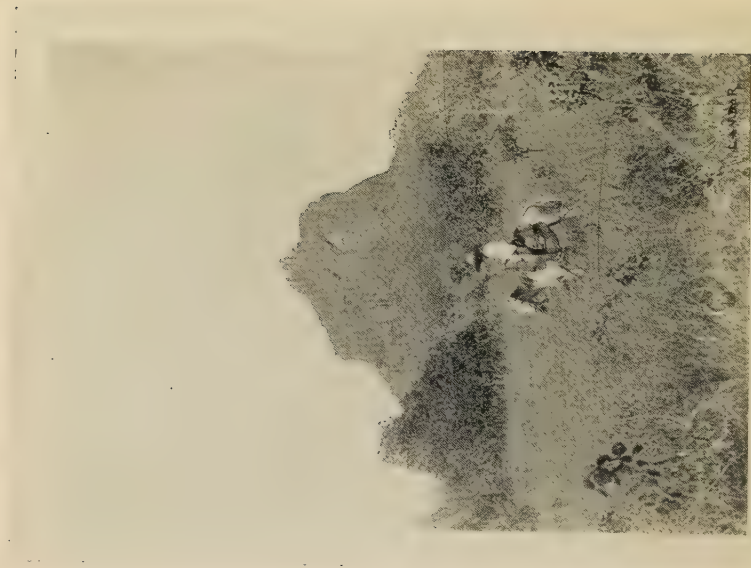
As we went along we obtained an imposing view to the north of an immense plateau in three terraces, the lower one appearing like the sea — it was so blue — with the brilliant red, upper portion rising out of it like a great island. The foreground of dark green, in great undulations, stood out in contrast to the light green of the slopes of the plateau on the top of which we were marching.



FOSSIL SKULL OF GIANT ANIMAL.
Side view.



FOSSIL SKULL OF A GIANT ANIMAL.
Discovered by author. (Seen from underneath.)



CHURCH ROCK.



A GRAND ROCK — "CHURCH ROCK."

MARCHING BY COMPASS

Central Brazil was certainly a country of flat sky-lines — so flat that often when the distance became of a pure cobalt blue, one had the impression of overlooking an immense ocean, to which the green undulations in sweeping lines in the nearer foreground added the impression of great waves.

It was indeed difficult to realize the stupendous magnitude of the scenes we constantly had before us. That day, for instance, the plateau to the north of us stretched across towards the east for 70° of the compass from bearings magnetic 320° (north-northwest) to 30° (north-northeast). Above the plateau was a strange effect of clouds — a succession of arrow-shaped, nebulous masses.

We still came upon basins of grey ashes — *cuvettes* — but in that region these were deeper than those we had observed so far, had luxuriant grass, and in the moist centre the invariable line of burity palm and heavily foliated trees.

Travelling on a northerly course, and then to the north-west, we descended, after having marched twenty kilometres, into a basin (elevation 1,950 feet) where a thick and wide deposit of fine white sand and minute crystals covered the deeper part of the depression. Then, farther on, the sand was replaced by the usual deposits of grey ashes which filled the remainder of the basin. A streamlet, which had its birth in the centre of the basin, flowed north into the Rio Manso, along one of the many cracks which were to be seen in that region and in the depressions we had previously crossed. We came upon a mighty flow of red and black lava with a somewhat frothy surface. It was in superposed layers from one to six inches deep, with an inclination to the east of 15° . The flow itself had a direction from west to east.

As we were marching by compass, with no trail whatever, we found ourselves entangled in a swampy valley

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with tall reeds, from which we had some difficulty in extricating ourselves. We eventually had to retrace our steps for six kilometres in order to find an easier way for our animals. After an examination of the country with my telescope from a high spot, I decided to go westward across a flat, swampy plain of ashes, sand, and water — most troublesome for the mules and horses. They sank deep into the soft ground and frequently rolled over, damaging saddles and baggage. One or two of my men had involuntary baths, when the animals' knees gave way under them.

As soon as we had emerged from that wearisome marsh the animals and men were so tired, although we had gone only twenty-two kilometres from our last camp, without the deviation (twenty-eight kilometres with deviation), that I had to encamp on the bank of the streamlet Fasciná, coming from the west. There we had the laborious task of spreading to dry all the articles that had got wet, including my bedding, tent, and a quantity of my clothing, which was not packed like all the rest in air and water-tight cases.

The stream Fasciná flowed into the Rio Furnas and eventually into the Rio Manso to the north, the latter a tributary of the Cuyabá River. That region had been rich in Mangabeira (the *Hancornia speciosa* M.), a wild, lactiferous plant of much value, producing a fruit called the *mangaba*.

June sixteenth. Minimum temperature 54° Fahrenheit; elevation 1,940 feet. On leaving camp, after a good deal of trouble in recovering our animals in the morning, as they had strayed in all directions, we found ourselves travelling along the edge of a large, grassy basin (elevation 2,000 feet) extending from southeast to northwest, with a wonderful growth of burity palms; then upon a second basin (elevation 2,100 feet) with deep deposits of ashes. We climbed higher, to 2,150 feet, where we found

A GREAT NATURAL ARCH

a third oval *cuvette* with a surface layer of ashes, merely a continuation of the preceding *cuvette*. We here resumed our northerly course, going through what the Brazilians call *chapada*, or high land scantily wooded.

To the southwest we had a high plateau with round, natural towers of red rock, resembling the walls of a fortress. Those red, cylindrical towers stood all along the summit of the range, with immense, square blocks of grey rock above them in horizontal strata. In the centre of that long range could be perceived a double-tiered crater and several grottoes. In its northern section the range was vertical, with red and yellow rocky walls over 300 feet high. On the summit of that rocky stratum were other strata with a dip to the south. Half way up could be observed a red ledge about ten feet thick (also with a dip to the south) all along the entire length of the range. Colossal blocks and flows of lava were to be seen 300 yards east of this range. In one place was an immense, natural arch, like the work of a skilful mason. At the northern end of the range stood a castle, the work of nature, with three square towers, and between them numerous monoliths or pillars standing on walls of columnar formation.

Evidently there was a crater in that northern part, the castle-like structure being merely formed by many superposed layers of yellow lava. Near the throat of the crater the lava was hard baked and of a bluish red colour. In the lower section the strata were each six feet thick, under a smooth band, absolutely horizontal, one hundred feet thick. There were then two top layers, each twenty feet thick, and four more layers each four feet thick, and slightly wavy. The last ones were somewhat shattered, and displayed large blocks moved out of position, apparently by a volcanic explosion.

In going round the northern corner of the range more similar buttresses, like towers, were disclosed — I could count as many as eight — projecting out of the immense,

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vertical block of rock. Those buttresses were of brown and bright yellow rock. The range had a general direction from southeast to northwest.

Great deposits of white sand and ashes were noticeable on the surface. In cuts and in the bed of a streamlet were strata of consolidated ashes in distinct layers one inch thick. The foot of the gigantic rocky mass was at an elevation of 1,700 feet. We were on a slanting plane forming a conical basin in continuation of the crater. To the north, where the basin opened, was a great stretch of cobalt blue in the distance, which looked just like a glimpse of the ocean. But it was not; it was the far-away plateau we had seen for some days.

We were now entering a region of the most impressive and weird scenery I had ever seen, except, indeed, in the Himalaya Mountains. Directly in front of us towered the Morro Plumão, a most striking, giant block of rock several hundred feet high, standing quite alone, and resembling a church surmounting a mediæval castle — not unlike St. Michael's Mount, only with land around instead of water. Even quite close to it the illusion was perfect. This wonderful, natural structure of dark red rock was in perfectly horizontal strata, each ten feet thick, separated and clearly defined by whitish lines, which aided to give the illusion of a wonderful work of masonry.

"Church-rock," as I called it — or "Spray-rock" (*Plumão*), as my men named it — stood majestically in solitary grandeur in the middle of a great subsidence of the soil. That great subsidence was in turn bordered by immense, vertical cliffs of the same rock of which "Church-rock" was formed. Indeed, it was clear that the soil had given way, leaving only that great rock standing. Even my men, for the first time since they had been with me, were deeply impressed by that wonderful spectacle; so much so that they all took off their hats, as Brazilians always do in passing churches.

CHURCH-ROCK

We traversed the great depression, which gave us irrefutable evidence of what had taken place in that zone. The great, rocky, plateau-like mountain to our left had split and fallen over on the north side, describing an arc of a circle of 90° . In fact, as we went along, in places where the rock underfoot was exposed, we were treading over laminated rock, the stratification of which was vertical, and corresponded exactly to that of the upstanding wall where the stratification was horizontal.

Behind "Church-rock" to the northwest was a massive plateau, beyond which stretched an immense, undulating depression with two outstretching spurs from southwest to northeast upon it. "Church-rock" was twenty-six kilometres from our last camp.

On the north side of "Church-rock," close to the conical hill upon which the giant quadrangle of rock rested, was a hump formed by huge blocks, the top one — a colossal one — just balanced, as if it might tumble over at any moment. Then on the side could be seen a lava-flow and huge masses of lava which had been shot up with great force and curled over, retaining the frothy appearance of its former state of ebullition.

Strangely enough, even when seen from the side and from behind (north-northwest view), "Church-rock" retained all the semblance of a castle and church perched up on that high pinnacle. From the north-northwest, besides the castellated towers which surmounted all, there appeared a perfect representation of a gabled roof over the body of the church, as well as the flying buttresses of the walls. Behind was a great cylindrical annex with a semispherical superstructure, such as is often to be seen behind Roman Catholic churches. The illusion was really wonderful.

Owing to the pools of water not far from "Church-rock" we called that spot *Caponga de la Lagoa*.

A few hundred yards beyond "Church-rock" we came

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upon another extraordinary sight: a quadrangular, rocky castle — a perfect cube of rock — which stood at a considerable elevation upon a conical base, some distance off the wall-like sides of the plateau. Strangely enough, a thin wall of rock, only a few feet thick, quite vertical, of great height and of great length, joined this quadrangular castle to the plateau. That wall had evidently remained standing when the plateau had subsided. The larger plateau along the foot of which we travelled ended in two great domes, one at each angle of its eastern terminus wall. The eastern part of that plateau was flat-topped, whereas the central portion rose into a double pyramid and looked not unlike a giant tent with a porch attachment. It was of a bright yellow colour, apparently sandstone and ashes. The work of erosion had been greater on the eastern face, owing, I think, to the prevalent wind on that side.

On looking back upon the great range of rock which ended abruptly near "Church-rock" (which, as we have seen, once formed part of it), a great, semicircular cavity was disclosed on its western face. The summit of the wall around the cavity rested on an inclined plane, which in its turn rested above a vertical concave wall. The latter wall of rock had conical buttresses at the terminal points.

West-northwest of the great wall was an immense depression. Only a conical hill rose above its last undulations. The upper edge of that depression was at an altitude of 1,550 feet above the sea level, whereas the top of "Church-rock" was fully a thousand feet higher — viz. 2,550 feet.

At the terminus of the first section of the cliff range, interrupted by a great fissure from the second section, another structure in course of formation not unlike "Church-rock" could be observed. It had a quadrangular tower surmounting it. There was in the second section of the range a regular quadrangle of rock, with a

RUNNING BEFORE A FOREST FIRE

high tower upon a conical hill, and another castle-like structure surmounting a conical base. The two were most impressive as they stood in their sombre red against the brilliantly blue sky.

Next to the second section of the range, to the north, was a high mountain of two twin-pointed peaks, shaped like a badly pitched tent. Then came another plateau, much eroded on its south side. Beyond was an immense, black plateau on three successive tiers; and this one, unlike the others of which it was merely a continuation, had sloping instead of vertical sides.

We had a nasty experience that day, which for the moment made us forget the beauty of that wonderful scenery. We were going through high scrub and stunted trees and tall grass, much dried by the intense heat, quite suffocating in the basin with the refraction from the huge rocks. A strong breeze sprang up, and we were delighted, when we saw, fast approaching, a dense black and white cloud rolling, as it were, along the ground. As it got nearer there was such loud crackling and explosions that it seemed like the volleys of musketry in a battle. My horses and mules pricked up their ears, lifting their heads high, sniffing, neighing, and braying. They became restless. Before we had time to realize what was the matter, we saw tongues of flames shoot out from the earth. Within a few seconds, with the wind which was blowing high, we found ourselves with a barrier of fire close behind us and fast gaining upon us. The trees seemed to flare up in a moment like matches or fireworks. A wave of terrific heat took our breath away. We were almost suffocated. There was only one way of escape — in front of us. For to the left we had the impassable barrier of rock; to the right the flames had already gained on us in a semicircle like a claw of fire. We stirred on our animals, lashing them. My men, with their heads wrapped to prevent suffocation from the stifling smoke, were in a

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great state of excitement. They were about to abandon the animals in order to save their own lives; but Alcides, Filippe, and I kept the rear, endeavouring to save men, baggage, and animals. The flames gained on us very quickly. They occasionally almost licked our animals. The mules and horses, now fully enveloped in dense, choking smoke, began to stampede, and soon all the animals were galloping away, sniffing, neighing, and braying frantically. In their disorderly flight they crashed against trees and tore off branches; stumbled over rocks and rolled over themselves; struggling up on their feet only to resume their mad race for life.

For some little time it was all we could do to keep a few yards in front of the flames, the heat of which was roasting our backs and necks. At last, in a desperate effort, we managed to get slightly ahead, and when we descended — some of the animals rolled down — into a deep depression, we found ourselves clear of the smoke. The wind was unfortunately blowing the way we were travelling, but in that depression we were sheltered, and the fire would not travel so fast. Our eyes were smarting terribly and we were coughing violently, our parched throats and lungs, filled with the pungent smoke, giving us a feeling of nausea. When we had reached a point of comparative safety we had to readjust all the loads on the pack-saddles, which had almost come undone. It was a wonder to me that in the precipitous flight we had lost nothing.

We had unavoidably deviated several kilometres from our course, as the animals were beyond guiding under those circumstances. Eventually, after a considerable detour in order to avoid the flames, we went over several undulations, especially a peninsula-like spine of rock rising over a great depression, then between two twin mountains. We emerged on the bank of the Rio Manso, flowing northward on a pebbly bed. We crossed it where it was one hundred metres wide, but only two to three

THE RIO MANSO

feet deep. There was a thick growth of vegetation — a belt some hundred yards wide — on both banks of the river. The Rio Manso was there at an altitude above the sea level of 1,150 feet.

I took observations for longitude and latitude by double altitudes at that place. (Latitude $13^{\circ} 53'$ south; longitude $55^{\circ} 13'$ west.) I had to halt there one day in order to give the animals a rest, after the long and reckless march of the previous day — a distance of forty-two kilometres.

The source of the Rio Manso was to the east-southeast some 120 kilometres from the place where we crossed it. Where we encamped it received a small streamlet, flowing over a bed of laminated, igneous rock and several successive strata of slate, which in some places were in a vertical position, in others at an angle of 40° . I noticed this vertical foliation and these laminated strata all over the great depression we had crossed in order to reach the Rio Manso.

The Rio Manso, which flowed into the Cuyabá River, was not to be confounded with the Rio Manso forming the head-waters of the Rio das Mortes, which eventually threw itself into the river Araguaya.

Owing to one of my animals having strayed away and the difficulty of finding it again in the tall grass and high vegetation, we were not able to leave camp until the afternoon of June eighteenth. Soon after starting on the march we went through a marvellous arch of thick foliage, creepers, bamboos, and *akurí* palms, previous to crossing a streamlet nine metres wide and one foot deep, flowing towards the west. We had no end of trouble near these streamlets, as they flowed between precipitous banks fifty to seventy feet high. There was no trail. The animals frequently lost their footing over the slippery, steep slope, and rolled down, baggage and all, until they reached the bottom; or else they would sometimes stick half way

ACROSS UNKNOWN SOUTH AMERICA

down against trees and liane, and we had the greatest difficulty in extricating them again.

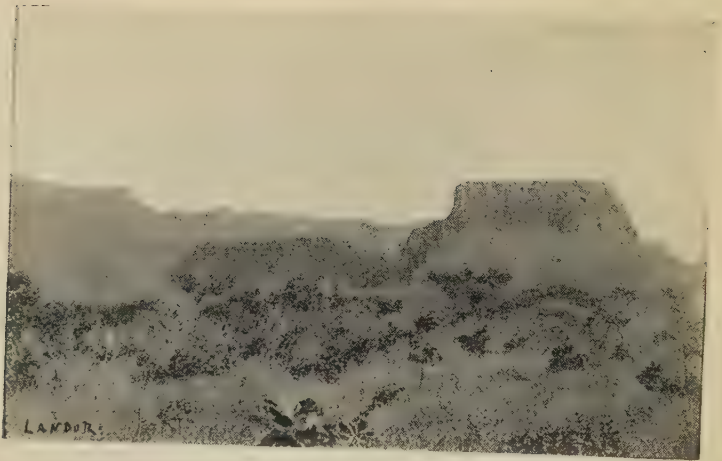
There was a low range extending from north to south along the left bank of the Rio Manso. From a hill 1,470 feet high above the sea level, on the right bank of the river, we saw a plateau in four terraces—the third of the line of plateaux we had seen on our preceding march. Upon getting higher we perceived to the south, beyond the four-terraced plateau, another plateau with vertical walls, and to the southwest a high, double-humped dome resembling Mount Vesuvius in Italy. Evidently one more of the innumerable, extinct volcanoes to be seen in that region. The mountainous mass extended in a more confused form farther to the southwest. On our side of the Rio Manso the country was gently undulating; in fact, it formed many parallel ridges of low, well-rounded hills with occasional deep hollows or basins between. One could not help being particularly struck by the wonderful regularity and strong similarity of the curves on the parallel hill-ranges, as if all had been turned out of the same mould. The hill-range we were on was 1,500 feet above the sea level. The others, excepting one or two, were lower.

There was an absolutely flat horizon line to the north, with no mountain range in sight. The country opening up before us was from that point almost entirely made up of campos, with growths of trees, principally near streams in the valleys. We crossed a watercourse thirty metres wide and one foot deep at an elevation of 1,350 feet. We called it the Palmeira, owing to the many palms upon its banks. Here grew many great *caja* or *cajazeiro* trees (of the genus *Anacardiaceæ*), the largest and tallest trees I had yet seen in Brazil, and *Garappa* or *Garabu* (of the genus *Terebinthaceæ*) trees—very interesting on account of their peculiar winged roots. They resembled the *nonoko*, which were characteristic of the Polynesian



OF ADIRONDACK ROCKY MOUNTAIN

Connected by natural wall of rock with the vertical-sided range in background.



QUADRANGULAR ROCKY MOUNTAIN.
Showing rocky wall connecting it to neighbouring range.



AUTHOR'S CARAVAN IN THE HEART OF MATTO GROSSO.

A NERVOUS MULE

Islands and Philippine Archipelago, only the Brazilian ones never attained proportions so large.

With endless trouble we had gone twenty kilometres. We had come to streams, where again, owing to the precipitous descents on the slippery, high banks, several mules fell over and rolled down into the stream. One mule, particularly, had become very nervous on approaching those places. Foreseeing the punishment which would be meted out, its knees invariably began to tremble and give way, and it let itself roll down purposely, every time we came to those difficult passages. Once down at the bottom, with baggage often immersed deep in water, we had the greatest difficulty in making the wretched animal get up again, and we frequently had to drag it bodily up the opposite slope by means of ropes. I have never seen an animal stand more beating than that brute did. Although I am most kind to animals, I must say for my men that this particular mule often drove us all to absolute despair. Dragging the dead weight of an animal up a steep slope, forty, fifty, or even seventy feet high — we were only seven men — was no joke at all. When you had to repeat the operation several times a day, it was somewhat trying. Once the brute had been dragged up to the top it would quickly get up on its legs, and marched well while on fairly good ground. But in moments of danger it was one of the most pusillanimous animals I have ever possessed.

I had given strict orders that in places of that kind the more timid animals were to be unloaded, and the loads conveyed across on men's backs. My orders were always disobeyed. The result generally was that not only did the men have to carry the loads eventually, but we had to carry the animals as well. Endless time and energy were thus wasted. That is what happens to people who try to save themselves trouble.

At sundown, after having witnessed a glorious view of

ACROSS UNKNOWN SOUTH AMERICA

the valley to the north, we descended rapidly amidst luxuriant vegetation of tall bamboos, *akurí* palms, and festooned liane, until we reached the Palmeira River, flowing from north to south. Having crossed it, we continued for three and a half kilometres through dense vegetation, and then recrossed it at a spot where it passed within enormous fissures in colossal masses of highly polished, yellow lava. After solidification, these masses of lava had been subjected to violent commotion, as their stratification was nearly in a vertical position.

Wherever possible I took observations for latitude and longitude, in order to ascertain my exact position; an eight-inch sextant, mercurial artificial horizon, and chronometers being used for the purpose. It is not easy to describe the torture you would have to endure when taking those tedious observations. The glass roof of the artificial horizon had unfortunately been broken. You would have to use great ingenuity in order to screen the mercury from the wind so as to obtain a well-defined reflection. No sooner would you get a perfect contact of the sun's image and its reflection, than some huge fly or other insect would begin to promenade on the mercury, disturbing its surface. Butterflies were even more troublesome, as they left upon the mercury — by the luminosity of which they were greatly attracted — sediments of multi-coloured powder and down from their wings and bodies. The mercury had to be carefully re-filtered before work could proceed. Then, what was worse, when both your hands were occupied — one holding the sextant, the other gently screwing the vernier — hundreds of mosquitoes, taking advantage of your helpless condition, buzzed round and settled on your nose, ears, neck, eyelids, and forehead, stinging you for all they were worth. Swarms of bees — a dwarf kind, with body in yellow and black stripes; fortunately these did not sting — also placidly roamed upon every available patch of skin with

CAMBAYUVAH RIVER

a provoking tickling. A great number of them settled along the edges of the eyelids, attracted by the sheen of the retina of the eye, into which they gazed with great interest. Others, more inquisitive, would explore the inside of your ears; while millions — actually millions — of *pium*, the tiny gnats, more impertinent than all the others taken together, dashed with great force up your nose, into your eyes, into your mouth, and far into your ears, and were most troublesome to remove. Your ankles and knees and wherever the skin was soft were itching terribly with *carrapatinhos*, and before you got through with your work, you were also swarming all over with ants of all sizes, which careered over your body and inflicted painful bites whenever you placed your hand upon your clothes to arrest their progress. When you had endured the torture long enough, and had managed to take a satisfactory solar observation, you generally had to remove all your clothes in order to get rid of the unpleasant parasites; and you then had a good hour's hard work cut out for you.

We continued our march northward, the temperature in the sun being 105° Fahrenheit. The minimum temperature had been 60° Fahrenheit during the night of June seventeenth, and 64° on June eighteenth. We crossed the Piraputanga River, flowing into the Rio Manso, and then passed over a magnificent flow of yellow, red, and black lava, the Cambayuvah River, a tributary of the Palmeira.

The Cambayuvah flowed through a great volcanic crack seventy-five feet high, the sides of the crack showing much-fissured strata in a vertical position. A smaller streamlet entered the Cambayuvah where we crossed it. Wonderfully beautiful, indeed, were the rapids among brilliantly coloured red and yellow rocks, the water winding its way among high, upstanding pillars and sharp blades of laminated rock.

A beautiful waterfall tumbled over with a great noise

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into a pool, scooped out of an immense block of such hardened rock that even the force of that violent stream seemed to have had but little erosive effect upon it. The edges of it were as sharp as possible, instead of being worn smooth and rounded by the constant, rapid flow of water. The rock had been hard baked, and was of a shiny black colour, almost as lustrous as crystal. At the bottom of those picturesque rapids was a circular, volcanic vent, the periphery of which had been blackened by the action of fire. The Cambayuvah followed a general course of southeast to northwest.

We camped near that enchanting spot, most picturesque, but terrible for my animals, as the grazing was poor. My mules, when let free at the end of the march, stood helpless around the camp, looking reproachfully at us, and making no effort to go far afield in order to get something to eat. The poor things were quite exhausted. I saw well that they could not last much longer. My men were constantly worrying me, and saying that we were going to sure perdition. They had become painfully homesick, and had they not been dead-tired, too — more so, perhaps, than the mules and horses — I should have expected great trouble from them. As it was, to lead on those men with persuasion and kindness was an exhausting mental effort for me. Once or twice the suggestion was made that if I did not agree to go back the way we had come I might perhaps get killed, and they would return alone. When I enquired whether any of them could find their way back alone, they said “no”; so I suggested that perhaps it would be to their advantage to let me live. I might eventually see them out of that difficulty.

In all my travels I have seldom come across men more helpless at finding their way about, or realizing in which direction they had travelled. Barring Alcides, none of them had any more idea whether we had travelled south, north, east, or west of Goyaz, than the man in the moon.

INSTINCT

Naturally I did not exert myself to enlighten them unduly, for there lay my great and only hold over them. I had fully realized that I was travelling with an itinerant lunatic asylum, and I treated my men accordingly. No matter what they did or said, I always managed to have things my own way. Never by violence, or by a persuasive flow of language — the means used by the average mortal. No, indeed; but by mere gentleness and kindness; very often by absolute silence. Few people realize the force of silence on momentous occasions; but of course few people know how to remain silently silent, if I may so express it, in moments when their life is seriously at stake. Silence is indeed the greatest force a man can use, if he knows how to use it. It is certainly invaluable in exploring, when naturally one is not always thrown into contact with the best of people.

The animals strayed away during the night, and it took all the best part of four hours to recover them in the morning. Instinct is a wonderful thing. They had all travelled to a place where, over undulating country, fairly open campos, slightly wooded with stunted trees, were to be found, and where they could obtain something to eat. When we crossed those campos after our departure from camp, foliated rock showed through the surface soil in many spots, in strata either displaced and left vertical — in many cases at an angle of 38° — or in its original, horizontal plane. Elsewhere dips in all kinds of directions showed that there must have been a good deal of commotion in that region when that part of the country subsided and formed the basin we were then crossing. The typical feature of all those undulations was their arched backs.

We were at a low elevation, only 1,300 feet above the sea level. We were travelling over immense quantities of marble pebbles and volcanic débris. We there made the acquaintance of the *gramadin*, a plant with curved

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spikes, which seldom attained a height of more than one inch above the ground. It was terribly poisonous if touched.

We went over three successive ridges (elevation 1,300 feet). On the summit of each ridge we found a profusion of marble débris and even large blocks immaculately white or else yellow, probably rendered of the latter colour by contact with iron, plentiful in that region.

On the summit of the sixth ridge (elevation 1,330 feet), that day, we came upon large sheets of foliated rock, again almost absolutely vertical in its stratification, and great masses of thin slate plates or foliations extending from east to west.

Farther on, from a high point, 1,450 feet above the sea level, we could gaze once more upon a gorgeous, panoramic view of the marvellous scenery we had left behind — the great plateaux of rock as red as fire, and “Church-rock” looming high against the sky. We kept on rising upon various undulations; that day’s march was one of continuous ascents and descents. At 1,600 feet we found more masses of vertically foliated slate, ashes consolidated into easily friable sheets, and large quantities of beautiful marble.

To the north and northeast we had delightful scenery, the *pao d’arco* trees in full bloom, of a reddish purple colour, adding greatly to the vivid colour-scheme of that view, with its cobalt blue of the distant mountains and the Veronese green of the campos in the foreground. Nearly all the ridges we had crossed which extended from northeast to southwest were well rounded, being fairly well padded with sediments of earth, sand, and ashes.

We descended to 1,300 feet (above the sea level) through thin forest, in a valley where bamboo was abundant, as well as *gamelleira* trees with their winged roots of great size. The *gamelleira* was somewhat larger than the *garappa* or *garabu*. We found in that valley a beau-

A POISONOUS STREAM

tiful grove of *akurí* palms, the palms being ten to fifteen feet high. In going through, cutting our way with *falcons* — long, heavy-bladed knives specially made for cutting through forests — we were much worried by spiders' webs of great size, from which we had trouble in extricating our heads and hands as we went along. There were thousands of those webs at the entrance of the forest, and we dragged them all along on our passage. With their viscous properties they clung to us, and we could only shake them off with difficulty.

Most interesting of all was the *cepa d'agua*, a powerful liane, four inches in diameter, festooned from the highest branches of trees, and which when cut ejected most delicious, cool water. Then there was a tree called by the Brazilians "*mulher pobre*," or "poor woman's tree" — do you know why? — because from its juice it was possible to make soap, which saved the expense of buying it. There was a roundabout way of reasoning for you.

Eighteen kilometres from our last camp we came to a rapid streamlet of the most limpid water, the Rio Mazagan (elevation 1,300 feet above the sea level), four metres wide and four inches deep. When we drank it it nearly made us ill, so foul was its taste of sulphur and lead. The treacherous stream flowed into the Cuyabá River.

There were many *tamburi* trees of great proportions, handsome trees with clean, healthy white bark and minute leaves — at the summit of the tree only. In the forest, although the taller trees were generally far apart, none of them had branches or leaves lower than thirty to forty feet from the ground. The *angico* or *angicu* (*Piptadenia rigida* Benth.), which was quite plentiful, was also a good-looking tree of appreciable height and circumference.

Upon emerging from the beautiful forest, quite clear underneath with only a few ferns, we crossed great campos — "*campina grande*," as my Brazilians called

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them. Skirting the forest in a northerly direction, we went over a low hill range with delightful clear campos and patches of forest. We crossed another streamlet of foul-tasting water — with a strong flavour apparently of lead.

In the great undulating valley we left behind — as we now altered our course slightly to the northwest — was prominent a double-humped hill which rose higher than any other except in the northwest portion of the landscape. There a high chain of hills could be seen.

When we crossed over the second ridge (elevation 1,400 feet), strewn with yellow lava pellets, at the end of extensive campos we obtained an imposing view to the north. An elevated flat-topped tableland of great magnitude rose in front of us — a perfectly straight line against the sky, but terminating abruptly with three gigantic steps, with a subsidiary one upon the second step, at its western end. This plateau stood out, a brilliant mass of cobalt blue with great projecting spurs, like a half-section of a cone surmounted by a semi-cylindrical tower along the southern wall of the plateau. Then a strange hill mass of four distinct composite domed heights with minor peaks stood between the plateau and us — and extended, like most of the other ranges, from southeast to northwest.



A GIANT DOME OF LAVA.



CAMPOS AND CHAPADA OF MATTO GROSSO.



A STREET OF DIAMANTINO.



THE DOGS OF THE EXPEDITION.

CHAPTER XXV

THE BLUE MOUNTAINS — THE CUYABÁ RIVER — INACCURATE MAPS — A REBELLION IN CAMP — INFAMY OF AUTHOR'S FOLLOWERS — THE LAGÕA DOS VEADOS AND THE SEVEN LAKES — FALLING BACK ON DIAMANTINO — ANOTHER MUTINY — SLAVERY — DESCENDING FROM THE TABLELAND

WE had gone ninety-six kilometres in four days' marching since leaving the Rio Manso. We were only a few kilometres from the Serra Azul, or Blue Mountains — truly mountains of the most vivid and purest cobalt blue I had ever seen — quite a wonderful spectacle.

We made our camp in a prairie with good grazing for our animals. Although we were at a comparatively low elevation — 1,150 feet above the sea level — the minimum temperature of the atmosphere was 56° Fahrenheit during the night.

On leaving camp — still proceeding north — we descended to 1,100 feet into a lovely stretch of magnificent grass with a lagoon. The level of the water was low, as we were then at the end of the dry season. On the flat grassy land were curious semispherical mounds, four to six metres in diameter and from two to six feet high. On each of these mounds were a few stunted trees. No trees whatever existed except upon these small mounds, the explanation being, I think, that the mounds had formed around the trees while these were growing, and not that the trees had grown upon the mounds.

As we were getting nearer, the Serra Azul to the north was most impressive. I think that it was partly due to the bluish foliage of the vegetation upon it that the range, even close by, appeared of so vivid a blue, and also to the

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deep blue shadows cast by the spurs which projected, some to the southeast, others due south — that is, it will be understood, on the southern face of the range.

Thick deposits of cinders lay in the valley. On approaching an intermediate and lower range we cut our way through scrub, chiefly of *sciadera* trees, seldom growing to a greater height than seven feet. The domed hills showed through the grass great blocks of volcanic rock, while at the foot of the hills could be noticed huge boulders of consolidated ashes with veins of crystals and marble. There, too, the stratification was vertical. There was lamination in some of the rock, but not in the granite blocks nor in the blocks of marble, which appeared to have been subjected to enormous heat. Some of the rock had been in a state of absolute ebullition.

At the spot where we crossed the range, starting our ascent from an elevation of 1,100 feet, were immense holes, vents, and cracks in the earth's crust. As we rose slightly higher among many chains of low hills, we were upon a horizontal stratum of laminated granite. Higher still we passed a semicircular hill composed of immense blocks of granite. In the centre of the semicircle was a great round hole, thirty feet in diameter, an extinct crater. Farther on, ascending upon an inclined plane, we came to another similar semicircle, not of rock that time, but of red earth and cinders. When we reached the highest point (elevation 1,270 feet) of the divide, we had to our left huge pinnacles and pillars of rock of the most fantastic shapes, monoliths from ten to fifteen feet high, and rocks hollowed by the action of fire. Big boulders, which had become perfectly rounded by having been shot through the air and revolved at a great speed while in a half-solid condition, were to be seen scattered all over the inclined planes of the saddle of the divide. Giant cacti grew in abundance in the interstices between rocks. Although most of the rocks were blackened outside, by chipping off the outer

A FREAK OF NATURE

surface one found that they contained inside beautiful white marble or else greyish granite. The latter was striated with thin layers, not more than a quarter or half an inch thick, of crystallized matter, forming veins in the blocks or dividing two strata.

Everywhere could be noticed remarkable perforations of all sizes in the rocks, great spherical or ovoid hollows, or cylindrical, tubular channels. In the ground were many volcanic vents with lips baked by fire.

On our right, a kilometre or so farther on, after having gone through an extensive stretch of red sand and lapilli, we came across three hills, the central one of which had the appearance of a cylindrical tower of masonry with windows and doors. It was a wonderful freak of nature. Under this huge tower were several caves and grottoes.

Descending upon the opposite side of the range, at an elevation of 1,200 feet we found the dry bed of a streamlet, which flowed in a northerly direction, when it did flow at all. On emerging from the wide hill mass — about eighteen kilometres across — we found ourselves among a lot of burity palms on the western spur of the Serra Azul. When we were actually upon them, the Blue Mountains lost their blue appearance and were more of a greyish green, owing to the vegetation which covered most of their slopes. The range was formed of three distinct terraces, the lower one being of greater height than the two upper ones. A number of low hill ranges, starting from the main range, branched off like spurs toward the south. The uppermost terrace of the main range was supported on a high, vertical wall of red rock.

On meeting the Rio Coralzinho we skirted it for some distance through the forest, then marched among a great many domes, small and large; after which we crossed a wonderful field of huge monoliths, superposed boulders, and rocks of all kinds of fantastic shapes.

We had marched thirty kilometres that day. We en-

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camped on the river Piraputangas, a tributary on the left side of the Cuyabá Grande River — the Cuyabá Grande being in its turn a tributary on the right of the Cuyabá River.

The Cuyabá River described almost an arc of a circle, in fact, quite a semicircle, its birth taking place in the Serra Azul. Where we crossed it we were only a short distance to the west from its point of origin.

Where we had made our camp we were in a large grassy plain about six kilometres long and nearly two kilometres wide. The rainy season was fast approaching. We came in for a regular downpour during the night, accompanied by high wind, which knocked down all our tents, as the pegs would not hold in the soft, moist ground. We had a busy time endeavouring to protect the baggage. We all were absolutely soaked. The minimum temperature was 52° Fahrenheit. In the morning, after the wind had abated and the rain had stopped, we were enveloped in thick fog.

We had descended to so low an altitude as 750 feet above the sea level on the north side of the Serra Azul, the lowest elevation we had been at for some considerable time. We had descended altogether from the highest part of the great Central Brazilian plateau. From that point all the waters would be flowing to the northeast or north. We were, in fact, within a stone's throw, to be more accurate, within the radius of a few kilometres, of the birthplace of the Rio Novo, the head-waters of the River Arinos, of the Rio Verde (Green River), and of the several sources of the Rio S. Manoel or das Tres Barras, or Paranatinga; and not distant from the sources of the great Xingu River.

The Serra Azul, extending from west to east, was interesting geographically, not only because it marked the northern terminus of the highest terrace of the great central plateau, but also because from it or near it rose



MARVELLOUS SCENERY OF THE CENTRAL BRAZILIAN PLATEAU.

"Church rock" standing in the centre.

WORTHLESS MAPS

two of the greatest rivers of Central Brazil — the Xingu and the Arinos (Tapajoz), the latter the most central and important river of Brazil, crossing the entire Republic from south to north, as far as the Amazon.

On June twenty-first we crossed the Piraputangas (elevation 750 feet above the sea level), where, owing to the steep banks, we had much difficulty in taking mules and baggage to the opposite side. We then proceeded across another large plain, skirting the spurs of the Serra Azul. Nine kilometres from camp we came to a stream eighty metres wide, which flowed from northeast to southwest. It had an average depth of one and a half feet. It was, I think, the Cuyabá Grande.

It was not easy to identify those rivers, as the existing maps of that country were absolutely worthless, most of them being filled in with fancy mountains and rivers, which either did not exist at all or were sometimes hundreds of kilometres out of their position. There were frequently mistakes of two, three, and more degrees in the latitudes and longitudes, even of important places. As for the tributary rivers, of which merely the mouths were known and named, they had supplied good material for the imagination of more or less artistic cartographers in order to fill in the rest of their course. Even the German map and the American maps of the International Bureau of American Republics, which were the two best, were extremely inaccurate in their representation of that region. For instance, the latter map — and nearly all the other maps — placed the Serra Azul some 180 or 200 kilometres south of its actual position. The German map was some 70 kilometres out. The Serra Azul could be seen from a great distance, and had been marked approximately and not by actual observations on the spot. Nor, of course, had the tributaries of the Cuyabá been explored or even seen except at their mouths; hence their imaginary courses.

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Considering how the maps of those regions had been got together, it was really wonderful that, with all their blunders, they gave as much information as they did. Unhappy, nevertheless, would be the poor traveller who relied on those maps in making a journey across the country. For instance, if you expected to come upon a certain river in one day and did not get there until after ten or fifteen days' hard marching; if you expected to find a mountain range — nearly as high as the Himalayas or at least as high as the Andes, according to the deep shading on the maps — and found instead an interminable flat plain; and if you saw on your map rivers marked navigable, and found rapids instead, in comparison with which the terrible ones of Niagara are mere child's play, you would certainly become rather sceptical of prettily drawn maps.

On most of the maps of Brazil one saw marked to the east of the Araguaya, in the Goyaz Province, an immense range with no less a name than Cordilheira Geral la Serra do Estrondo — or “General Range of the Mountains of Noise.” They were marked as the most prominent range in Brazil, quite as high as the Andes of Peru, Bolivia, and Chili; whereas, as a matter of fact, I was told on good authority that they were mere low hills, where there were any hills at all.

To come to great geographical mistakes which came under my direct observation, I found a very palpable one in the head-waters of the Cuyabá River, which had their source to the north of the Serra Azul and not to the south, as marked on many maps, including the Brazilian official maps.

We had to our left the Serra das Pedra — “Range of Rocks” — an extraordinarily rocky range, which was crossed almost at right angles by the Chapadão das Porcas. We marched through a wonderful growth of *palmeiras*, some of the palms being as much as thirty feet

KEBOH HILL-RANGE

high. Buritys were innumerable along a small stream — the Rio Estivado — flowing southwest into the Cubayá River. There were great quantities of *mangabeira* trees. We proceeded northward along a *chapada*, a capital Brazilian name which denotes a locality that is neither a forest nor a prairie. The *chapada* had scanty trees and scrub, but not enough to make it into a forest.

We were marching over low hills with surface deposits of sand and cinders. We gradually reached an elevation of 1,050 feet some eighteen kilometres from camp, and shortly after, and only fifty feet lower, entered a refreshing grove of giant *palmeiras* and buritys along the Rio das Porcas, flowing westward. There, north of the stream, we went across more clean campos, 1,700 metres wide, bounded to the north by the thickly wooded hill-range Keboh, extending before us from east to west.

We crossed this range in the centre, during a strong gale from the southwest. The wind cleared the sky, that had been overcast and had made the atmosphere heavy. Again that afternoon, when the wind ceased, I noticed the peculiar striations in the sky — not in straight lines that time, but in great and most regular curves converging to the west.

The valley became narrower as we went along. Two twin, conical hills ended the northern extremity of the range (southeast to northwest) which we had on our left — a great mass of granite blocks in the centre of the plain rising higher and higher into regular domes. The plain itself, on an incline, showed two swellings of great magnitude, the one to our right about 120 feet higher than the plain, the elevation of which was 1,000 feet. On the west side of those two swellings was a confused mass of huge blocks of granite, of all sizes and shapes, which to all appearances had been shot up from underneath by some internal force. They were outwardly much blackened by the action of fire, but internally were of a grey tint. A

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little farther we were encircled by basaltic columns of great height, many of them fractured, forming a fantastic sky-line. Some resembled the spires of a cathedral; groups of others had the appearance of the ruins of an ancient fortress; others stood up like giant obelisks; while accumulations of others formed more or less regular pyramids.

After leaving that strange basin, we were once more travelling across patches of clean *chapada* and dirty *chapada*, according to the soil and quantity of moisture; then over arid campos spreading for fifteen kilometres without one single drop of water.

At sundown, after having gone over several undulations varying from 850 to 900 feet above the sea level, we went over a hill slightly higher — 950 feet — with a summit of ashes, red earth, and yellow, lava pellets, as well as great sheets of foliated lava.

Under a most wonderful effect of light to the west — three superposed horizontal bands of luminous yellow, violet, and brilliant vermilion, over the deep cobalt mountain range in the distance — we arrived, my men being thirsty and tired, at a little rivulet. We had marched forty-two kilometres that day.

My men felt the cold intensely during the night; the minimum temperature was 48° Fahrenheit, with a high, cutting wind. Yet we were at a low elevation, merely 750 feet above the sea level. There were, as usual, moans and groans all night, more toothache and rheumatic pains and aching bones in the morning. The discontent among my men had reached a trying point. They worried me continuously to such an extent — indeed, as never in my life I had been worried before — that I was within an ace of breaking my vow of never losing my patience and calm. In my long experience of exploring I have always had to deal with the most troublesome types of men imaginable, but never with any quite so unpleasant as those I had in Brazil.

ONE MORE MUTINY

When, the next morning, I ordered them to pack the animals in order to proceed on our journey, there was an unpleasant scene, approaching mutiny. They knocked things about and refused to go on. Then they sat, rifles in hand, a little way off, grumbling and grunting, with vicious expressions upon their faces. They were going to do wonderful things; they were indeed! I overheard them. One man came forward — the spokesman. The men claimed their money up to date since the last payment made to them — only a fortnight before. They all wished to go.

“Certainly,” was my immediate reply. Without a moment’s hesitation they were each handed over their full pay, and without giving the slightest attention to them, Alcides, who had remained faithful, and I — poor Filippe had been dragged against himself into the plot — collected all the animals and packed them. Without one look or word, as if they had not existed, I started off the troop of animals and got on my saddle to depart last. With the corner of my eye I kept a watch on them, as with men of that kind the chief danger was when you had your back turned.

I had gone only a few yards when I heard some one sobbing behind my mule. As I turned round, the two outstretched hands of Filippe were handing me back the sum of money I had paid a few moments before. He was begging me to keep it safely for him. Then two more hands urged me to take back for safe keeping the wages they had just received. The faces of the owners of those hands were too comic for words: the cheeks shining with abundant tears that streamed down, the eyes red and swollen, the mouths stretched in nervous strain from ear to ear. Behind came two more men, looking as mournful as if they were being led to execution.

They all begged to be re-employed. I let them follow, on foot, for several kilometres without saying a word, struggling through the heavy marching painfully and

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wading chest-deep across the streams. We crossed the Ribeirão Chabo or Guebo, twenty-five metres wide and three feet deep, at an elevation of 730 feet, then we waded through another stream flowing south, with a zone of wonderful *palmeiras* along its banks. We then emerged into a magnificent plain with a barrier of low hills to the northwest. Six kilometres farther we waded across the Planchão stream, five metres wide and six inches deep. Marching on horseback was delightful, the maximum temperature being only 74° Fahrenheit in the shade. Another stream, flowing from north to south, the Planchãozinho, whose foul water was quite disgusting to drink, although beautifully limpid, was then negotiated.

I was delighted at meeting with so many streams, for there was nothing my men hated more than to get into the water. They felt very sorry for themselves, to be struggling along as best they could, following the animals like humble sheep instead of being comfortably mounted on quadrupeds. We travelled a considerable distance through campos, but owing to some baggage which had been lost, we eventually had to retrace our steps as far as the Planchãozinho River, on the banks of which we encamped. This was unfortunate, as the water had a sickening flavour and made even our coffee and tea taste like poison.

Misfortunes never come alone. In overhauling my baggage I discovered, to my dismay, that my men, in order to force me to go back the way we had come, had gradually thrown away most of the provisions, which should have lasted us some six to seven months longer. We had only sufficient food to last us a few days. The men confessed their misdeed. The country provided absolutely nothing to eat, and I had to face the problem of either dying of starvation or falling back on some place where we could purchase fresh provisions. It was out of the question, unless one wished to commit suicide and

SHORTAGE OF FOOD

a quintuple murder, to endeavour to push on towards my goal, Manaos on the Amazon, some 1,600 kilometres distant as the crow flies, or at least 4,000 to 5,000 kilometres travelling, with possible deviations, without some of which it was not possible to proceed. We could certainly not fall back on our point of departure, the terminus of the railway at Araguay, 1,596 kilometres distant; nor on Goyaz, the last city we had seen, 1,116 kilometres away, so that the only way to escape death was to fall back on the ancient settlement of Diamantino, the farthest village in Central Brazil, a place once established by the first Portuguese settlers of Brazil while in search of diamonds.

Diamantino was practically in the very centre of the thicker part of South America, without counting Patagonia. It was almost equidistant — roughly speaking, some 2,560 kilometres as the crow flies — from Pernambuco on the Atlantic Coast to the east, Callao (Lima) in Peru on the Pacific Coast to the west, Georgetown in British Guiana to the north, and Buenos Aires in the Argentine Republic. Although so far in the interior and almost inaccessible from the north, east, and west, Diamantino could be reached comparatively easily from the south, travelling by river up the Parana, Paraguay, and the Cuyabá Rivers, as far as Rosario, thence by trail to Diamantino. I had heard that the place was once flourishing, but had since become almost totally abandoned. I thought that perhaps I might be able to purchase sufficient provisions to get along; and, hope being one of my everlasting good qualities, I also dreamt that perhaps I might there get fresh men.

It was indeed with a bleeding heart, when I had reached a point some 200 kilometres north of the Serra Azul, that I had to alter my course, which had been practically due north, into a southwesterly direction, and endeavour to find Diamantino. My men were delighted at the prospect of seeing human beings again. We had

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met no one for some weeks. We made terrific marches daily in order to reach that village before the food gave out altogether.

The nights were cold, 47° Fahrenheit being the minimum at our camp on June twenty-third.

We crossed a small range of hills over a pass 930 feet above the sea level, and found ourselves in a spacious *cuvette* with the usual central line of buritys and thick vegetation (elevation 900 feet). Soaring over our heads were a number of *gavião caboclo* (*Heterospidias meridionalis*), a kind of falcon, rending the air with their unmusical shrieks.

After leaving the *cuvette* we began to ascend the Estivado Range, very steep and rocky. Near the summit we struggled through a field of great, igneous boulders, chiefly upright pillars of granite and white marble. Upon the pass (elevation 1,400 feet) was a circular depression some 300 metres in diameter, perfectly flat-bottomed and grassy. It was surrounded by cones eighty to a hundred feet high. On the southeast side of the range — very steep — was abundant rock, and to the northwest side was a padding of brown earth on a gentle incline divided into terraces. Here and there pointed noses of volcanic blocks, similar to those we had found on the opposite side of the range, showed through. We went across a depression where water, dripping down the mountain-side, had remained stagnant, rendering that spot almost impassable. The animals sank chest-deep into slush, crashing through the thick and much-entangled growth of live and fallen bamboos.

More campos, fairly wide, were found beyond this, and great stretches of foliated slate and sandstone in strata turned over into a vertical position, and quantities of débris. Then again we cut our way through a cool growth of bamboos, handsome *palmeiras* and *akuri* palms; after which we emerged into campos once more, rising

THE LAGOON OF THE DEER

gradually to an elevation of 1,550 feet upon an undulating terrace of the second section of the Estivado range.

Pulling and pushing the mules and horses over a lot of boulders and up a steep incline, we reached the highest point of the range on our route — 1,800 feet above the sea level. Again the stratification of red and grey rock in layers from six inches to a foot thick, standing vertically, showed what a geological commotion there must have been in those regions. The summit of the range, extending from north to south, appeared like the teeth of a saw, so broken up was it into repeated undulations. On the west side of the range we found a gentle slope of clear campos with merely a few stunted trees upon them.

Before us to the west stood high the level sky-line of a tableland, showing perfectly straight, parallel strata of rock extending all along its face, but slightly undulated near the summit of the range. Otherwise its grassy slopes were quite undisturbed in their virgin smoothness.

In the distance, to the north of our course, was a great lagoon — the Lagõa dos Veados, “Lagoon of the Deer” — a most important point in South America, for it was there that the great Arinos (Tapajoz) River rose. The lagoon — three kilometres long and less than a kilometre wide — had no visible outlet, but some hundreds of metres away a spring came out of the earth, forming the Rio Preto (Black River). The Rio Preto, soon joined by the Rio Novo, which we had seen descending from the Serra Azul, formed the Arinos River and could certainly be considered the head-waters of that immense tributary of the Amazon.

A short distance south of Diamantino were the Sete Lagõas, or Seven Lakes — as a matter of fact, they numbered more than seven — circular pools only a few yards in diameter but extraordinarily deep, evidently of volcanic origin, and filled with water at a later time. Around their edges a remarkably luxuriant growth of

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buritys could be admired. A great valley extending south with a central ridge could be distinguished. On it was the meeting-place of the Rio Diamantino and the Rio do Ouro (River of Gold), which, with the Sete Lagõas, formed another most important point of South America, for it was there that the Great Paraguay or Parana River rose.

It was thus interesting to note that within almost a stone's throw rose two of the most powerful rivers of South America, one flowing due north into the Amazon, the other almost due south as far as Buenos Aires and Montevideo, where it entered the Atlantic Ocean.

A great confusion is made on most maps between those lagoons and the actual birthplaces of those important streams. The ancient Jesuits and friars had a fair idea of geography. I have in my possession a remarkable work in Italian published in Rome in 1698 by Father John Joseph of S. Teresa — a barefooted Carmelite. It is entitled *The History of the Wars in the Kingdom of Brazil between the Crown of Portugal and the Republic of Holland*. The book contains a number of extraordinary maps of Brazil. Those of the principal harbours give a splendid idea of the places represented. The coastline of the continent is indicated with fair accuracy. It is curious to note that the author of that book and the cartographer place the sources of the Amazon and of the river Plate in the same spot, as descending on opposite sides of a range extending from east to west — a range which does not exist, unless it was intended to represent the Central Brazilian plateau. "The river S. Francisco," Father John Joseph goes on to state, "has also its birth in the spot where the Amazon is born, but this is not sure." The cartographer, in fact, places the head-waters of that river close to the head-waters of the Amazon, and makes them flow through a large lagoon in the heart of Brazil, evidently the Great "Lagõa dos Veados" or else the "Sete



MATTO GROSSO GIRL.
A mixture of Portuguese, Indian, and negro blood.



BRAZILIAN CHILD.
A mixture of Portuguese and negro.

A LARGE FOREST

Lagõas ” to which reference has previously been made in this chapter. “The Rio Grande (Rio Parana, Paraguay), one of the most celebrated in Brazil,” proceeds the Carmelite Father, “is born already swollen by plentiful waters (*sic*) in the interior of *terra firma*! Near its sources it forms a lagoon twenty leagues in circumference.” All this is, of course, geographically wrong. The Rio S. Francisco has its birth far to the southeast, in Minas Geraes, some hundreds of kilometres distant from that lagoon and several thousand from the real source of the Amazon.

Also the friar must have mistaken, evidently from information received, the sources of the Arinos for the sources of the Amazon, which are really located some 15° of longitude west. It is nevertheless curious that so far back as 1698 the existence of the lagoon should be known at all — perhaps they had heard of it from the adventurous Paulista Bandeirantes — and that they should have placed it nearly in its proper latitude and longitude on their maps. Apparently Father John Joseph was not aware of the existence of the Great Araguaya and Xingu Rivers. Having compiled his map from information, he confused those rivers with the S. Francisco River.

Upon descending from the Serra into the valley we soon came to a large forest with a luxuriant edge of *peroba* (a word originating, I believe, from the words *ipe* and *roba* in the *Tupi* language), which was known in four different varieties: viz. the *peroba amarella* (yellow), *parda* (brown), *reversa* (knotty), and *rosa* (rose-coloured), technically named: *Aspidosperma polyneuron* M. Arg., *Aspidosperma leucomelum* Warmg., *Aspidosperma sp.*, *Aspidosperma dasycarpon* A.

Then there were also plentiful *garabu* and other tall trees. Before getting to the edge of the forest I noticed among the rocks some beautiful specimens of the *apita*

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cactus, ten feet and more in height, in appearance not unlike giant artichokes.

Near its beginning, where it was three metres wide and six inches deep, we crossed the Estivado River, which, with a group of other streamlets, may share the honour of being one of the sources of the Arinos. It flowed in a north-westerly direction.

We were pushing on for all we were worth, for we had come to the end of our food. Up and down we went over a troublesome series of great, elongated ridges, like parallel dunes, the highest elevation on them being 2,050 feet, the depressions 1,950 feet. We came to a sweetly pretty streamlet, the Mollah, flowing north into the Paraguay River, and shortly afterwards to the Caittä and the Corisho (elevation 1,500 feet). They were the three real and true sources of the Paraguay, within a short distance of the Seven Lakes.

We had marched fifty kilometres that day over rough country. My animals were quite exhausted. Yet early next morning we pushed on once more over transverse undulations and across grassy *cuvettes*, slightly conical, with circular pools of water in the centre and a florid growth of bamboos in the lowest point of the *cuvettes*. We ascended over more dyke-like obstructions on our way (elevation 1,700 feet) and descended once more into a vast basin of campos with stunted trees. At its lowest point there was from northeast to southwest a line of magnificent tall trees. The forest was so dense there that when we entered it we were quite in the dark, as if going through a tunnel. There were fine specimens of various kinds of the *jua* or *juaz* or *jurubeba* (*solanum*), a medicinal plant five to six feet high with enormous, dentate leaves, and shaped not unlike a vine leaf, possessing upright spikes on their dorsal or midrib and on the veins of the leaf.

Then there was plentiful "*cepa de pappo*," a common

THE DOGS SUFFER

liane like a huge boa-constrictor winding its way in a spiral up the tallest trees. I saw some of those liane three inches in diameter, with a smooth, whitish bark.

The soil at the bottom of the valley (1,500 feet above sea level) was mostly composed of cinders, but up the slopes white sand was predominant, mixed with ashes. We travelled over a lava flow which formed the bed of the river Macucu, flowing eastward. Guided by the noise, we found a most beautiful waterfall, 100 feet high, over an extinct, circular crater with vertical walls. We kept on rising over a gentle incline, and having reached an elevation of 1,750 feet, we found ourselves suddenly on the upper edge of a great, crescent-shaped depression extending in a semicircle from northeast to southwest. Its walls were one-tiered to the west, with a flat tableland on their summit, but were divided into two terraces in the northern part, where ranges of hills rose on the plateau.

We had a rapid, steep descent among great, rectangular blocks of conglomerate (white marble pebbles embedded in iron rock), great sheets of lava, and sediments of red earth, solidified in places into half-formed rock. I noticed extensive lava flows which had run towards the west; then we came upon extraordinary quantities of loose, white marble pebbles and chips. We made our way down upon a kind of spur of red lava, frightfully slippery for my animals. The poor beasts were quite worn out with fatigue.

From the round dome of the headland we perceived to the south a second great circle of flat-topped heights. The immense flow of red lava on which we were radiated terrific heat, which it had absorbed from the sun's rays. My dogs, being nearer the ground than we were, had great difficulty in breathing. Their heads and tails hung low, and their tongues dangled fully out of their mouths. They stumbled along, panting pitifully. Even we, on our mounts, felt nearly suffocated by the stifling heat from

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the sun above and the lava below. The dogs were amusing enough, curling down quickly to rest wherever a mangy shrub gave the slightest suspicion of a shade. The men, more stupid always than beasts, were sweating and swearing freely, and thumped mercilessly on the rumps of the tired animals with the butts and muzzles of their rifles, in order to urge them along.

The very sound of the mules' neck-bells seemed tired and worn; its brisk tinkling of our days of vigour had given room to a monotonous and feeble, almost dead, ding . . . dong, at long intervals, well suggesting the exhaustion of the poor animals, which were just able to drag along. The slightest obstacle — a loose stone, a step in the lava and first one animal, then another, would collapse and roll down, and we had to dismount and help them up on their feet again — quite a hard job, I can tell you, when the animals were nearly dead and would not get up again.

As we went along, more and more headlands of the great plateau appeared before us to the west. We still went on descending on the top of the long spur of lava. When not too busy with our animals, and quite out of breath with the heat and stifling air from the heated rock, I sometimes glanced at the glorious panorama on both sides of us. When we had proceeded farther I ascertained that there were really two crescents contained side by side within a larger crescent. Under us to the south a vast, undulating plain stretched as far as the eye could see toward the southwest and west. On describing a revolution upon your heels your eye met the other end of the larger crescent plateau to the northwest. The Serra do Tombador extended in a southwesterly direction from north of Diamantino to S. Luiz de Caceres, to the west of the Paraguay River. The height of the spur on which we were was 1,350 feet above the sea level.

We had come in a great circle on the upper edge.

HIGH PRICE OF LIVING

A trail could be seen crossing the great undulating valley below us. It passed at the western terminus of the spur we were on. Evidently that was the trail connecting Diamantino with Cuyabá (the capital of Matto Grosso) via Rosario. The sight of a trail was most exhilarating to my men. Suddenly and quite unexpectedly we came upon a few wretched, tumble-down houses, if one may call them so, smothered in vegetation which grew everywhere. My animals themselves seemed astonished at the unusual sight. The horses neighed and the mules brayed loudly. Masonry work perhaps suggested to them more substantial meals. Down a precipitous ravine, over large boulders and stumbling into big holes, into which the mules disappeared for a few seconds at a time . . . we found ourselves in the main street of Diamantino.

The village — the local people called it “a city” — was the very picture of misery, yet to us it seemed as if we had dropped into the middle of London or Paris. There were a few resident traders, two or three Brazilians, two Italians, and a Turk. All were most hospitable and kind. The chief industry of the place was rubber, which found its way to the coast via the Paraguay River.

Formerly Diamantino was a flourishing place because diamonds were found in abundance. Even now they can be found along the river, but the difficulty of access, even by the easiest way, and the great expense of living there have gradually depopulated the place, which was quite in an abandoned state when I was there.

Here are some of the minimum prices which the rubber collectors had to pay for articles of necessity: Beans, 1s. 6d. to 2s. per litre,¹ or about 4s. a pound; rice, 2s. per litre; flour, 1s. 4d. per litre, about 4s. a pound; sugar, 5s. per kilo (2 pounds), rapadura, or sugar block, 4s. per small cake; tobacco, 5s. per metre of twist; salt,

¹ A litre is a cube the sides of which are $3\frac{1}{8}$ inches.

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2s. 8d. to 3s. per litre; coffee, 6s. 6d. per kilo; lard, 6s. 6d. per kilo; purified lard in tins, 16s. to 20s. per 2 kilos. Bars of the commonest laundry soap, 4s. each bar; chickens, 10s. to 15s. each; eggs, 10s. to 12s. a dozen; small tins of sardines (containing five sardines) of the most inferior kind, 10s. to 15s. a tin; a one-pound tin of the commonest French salt butter, 15s.

A genial banquet was offered me on my arrival. The schoolmistress was set to prepare an excellent and plentiful meal. The mayor and all the notabilities of the place in their Sunday clothing came to fetch me at the house of the firm of Orlando Brothers, where I had been most hospitably sheltered, and where I had been requested to wait for them. At the appointed time they arrived — in frock coats, and each carrying an umbrella.

“Is it raining?” I inquired in my astonishment, at seeing the array of articles which I had not seen for several months, especially as a few minutes before I had been outside and it was a lovely starlit night.

“Oh, no, indeed, it is not raining; we carry the umbrellas in due honour to you!” they replied in a chorus, accompanied by a grand bow.

This was such an extraordinary compliment that it really took me some time before I could grasp the meaning of it. It seemed that according to the social rules of Diamantino, Matto Grosso, no one could be considered fully dressed unless carrying an umbrella. Rain or shine, the people of Diamantino carried their umbrellas on grand occasions.

After that one of the gentlemen pulled out of his pocket a long slip of paper and proceeded to read a speech of welcome. I answered in a few humble words. Another gentleman — there were eight altogether — produced another slip, which he duly read in a sonorous voice. Again I replied as best I could. Then, as I was getting really anxious lest some one else should be speechifying

ASTRONOMICAL OBSERVATIONS

again, the mayor of the place offered me his arm, and followed in a most respectful manner by the others, we adjourned to the schoolroom, where the feast was spread upon the table.

More speeches when we entered the room, more speeches before we sat down, speeches in the middle of dinner, speeches after dinner. Unaware of what was coming, I had exhausted all the compliments I could think of in my first speech, and I had to tax my poor brain considerably to reply with grace — especially as I had to speak in Portuguese — to the many charming things which my thoughtful hosts said. The banquet went off well. It is difficult to imagine more considerate, kindly people than those exiles in that far-away spot.

I took careful and repeated astronomical observations for latitude and longitude in order to establish the exact position of that settlement. Latitude $14^{\circ} 21.7'$ south; longitude $56^{\circ} 56'$ west. I purchased all the food I could possibly collect — enough to last us some six months, which cost me a small fortune — as I intended to push out of the place and proceed northward at once.

Four of my men became badly intoxicated upon our arrival. There was another mutiny. They again claimed their pay up to date and wished to leave me. At once they received their money. It was such a relief to me when they went off, even for a few hours, that I was always glad to give them the money and have a short mental rest while they kept away. Unfortunately it was impossible to obtain a single extra man in Diamantino. Labour was scarce, and the few labourers in existence were in absolute slavery. Indeed, slavery existed — it exists to-day — in all Central Brazil, just as it did before slavery was abolished. Only in the old days of legal slavery it was limited to negroes; now the slaves are negroes, mulattoes, white people, even some Europeans. I have

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seen with my own eyes a German gentleman of refinement in that humble condition.

In the present condition of things the slave, in the first instance, sells himself or is sold by his family. There were indeed few, if any, of the labouring classes in Matto Grosso and Goyaz provinces who were free men or women. All were owned by somebody, and if you wished to employ them, especially to take them away from a village or a city, you had to purchase them from their owners. That meant that if you intended to employ a man, even for a few days, you had to disburse a purchase sum equivalent to two or three hundred pounds sterling, sometimes more. In the following way it was made impossible for the slaves to become free again. Taking advantage of the poverty and vanity of those people, loans of money were offered them in the first instance, and also luxuries in the way of tinned food, clothing, revolvers, and rifles. When once they had accepted, and could not repay the sum or value of the articles received, they became the property of the lender, who took good care to increase the debt constantly by supplying cheap articles to them at fifty times their actual cost. The *seringueiro*, or rubber collector, had a *caderneta*, or booklet, and the master a *livro maestro*, or account book, in which often double the quantity of articles actually received by the rubber collector were entered. The debt thus increased by leaps and bounds, and in a short time a labourer owed his master two or three hundred pounds. The rubber collectors tried hard to repay the debt in rubber, which they sold to their masters at a low rate; but it was always easy for the masters to keep the men in debt.

It must be said for the masters that their slaves were not in any way ill-treated; on the contrary — except that a man was seldom given the slightest chance of redeeming himself — they were indeed treated as well as circumstances permitted. Labour, it must be remembered, was

AN AMUSING PLOT

so scarce and valuable — it was almost an impossibility to obtain labour in Central Brazil — that it was the care of the master not to lose a labourer.

Much is to be said for the honour of even the worst types of Brazilians. Although many of them would not think twice of murdering or robbing a stranger of all he possessed, they were seldom known to defraud their owners by escaping. A man who ran away from his owner was looked down upon by the entire community. Again, it must be stated that the chances of escape, in those distant regions, were indeed very remote. An escaped slave with no money could not go very far, and he would soon die of starvation.

I must confess that, although I tried hard to discover a way by which labour could be obtained and retained in Brazil with the existing laws, I could not find one practicable except that used by the Brazilians, viz. slavery.

The people of Diamantino tried hard to induce one or two men to accompany me, and I was willing to buy them out and eventually would have set them free altogether at the end of the expedition, but they were all so terrified of the Indians if they left the “city” that they preferred to remain slaves.

Alcides had gone round to look for a barber. There was only one in Diamantino, and he was in prison for the murder of his wife, or for some other such trifling matter. Armed with a pair of my scissors, Alcides went to the prison to have his hair cut. Once there he took the opportunity to explain to the prisoner that it could be arranged to procure his escape, if he were willing to join the expedition. The barber, who had not inquired which way we should be travelling, jumped at the idea. This necessitated having my hair cut too — rather a trial with scissors that did not cut — in order to arrange matters further in detail. With a special permission from the

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local authorities, the barber was let out accompanied by two policemen, the only two in the place, in order that he might reduce my hair by half its length or more.

While I underwent actual torture in having my hair clipped, as the prisoner's hands were trembling with excitement, and my ears had various narrow escapes, Alcides, who, when he wished, had very persuasive manners, induced not only the prisoner, but the two policemen — all three — to escape and join the expedition. I must say that I did not at all look forward to the prospect of my three new companions; but we were in terrible want of hands. I had visions that my expedition would be entirely wrecked. There was a limit to human endurance, and we could not perform miracles. We still had thousands of kilometres to travel over most difficult and dangerous country. Besides, I reflected, after all, I might only be performing an act of kindness by relieving the town of the expense and trouble of keeping its only prisoner, not to speak of the police force.

All was satisfactorily arranged, when the prisoner inquired where we were going. You should have seen his face when I told him.

"No, no, no!" he quickly replied. "No, no, no, no!" and he waved my scissors in the air. "I will not come! I will remain in prison all my life rather than be eaten up by cannibals! No, no, no, no . . . no, no, no, no . . . !" he went on muttering at intervals, as he gave the last clipping touches to my hair. He hastened through his job, received his pay in silence, and asked the policemen to take him back quickly to the prison. When the chains, which had temporarily been removed, were put again around his wrists, he departed, shaking his head and muttering again — "No, no, no, no . . . !"

The wise policemen, too, said that naturally, as their prisoner would not escape, they were obliged to remain and keep guard over him . . . it was not through lack of

SECRET OF SUCCESSFUL TRAVELLING

courage that they would not come; it was because of their duty!

Of course, Alcides was sadly disappointed, but I was delighted, when it all fell through.

I owe the success of my expeditions to the fact that, no matter what happens, I never will stop anywhere. It is quite fatal, on expeditions of that kind, to stop for any length of time. If you do, the fatigue, the worry, and illness make it generally impossible to start again — all things which you do not feel quite so much, as long as you can keep moving. Many a disaster in exploring expeditions could easily have been avoided, had the people known this secret of successful travelling. Push on at all costs — until, of course, you are actually dead.

With my reduced party of two men (Alcides and Filippe) I had to arrange matters differently, and decided to abandon part of my baggage, all things, in fact, which were not absolutely necessary, taking only food, instruments for scientific observations, cameras, and photographic plates.

Alcides and Filippe, who by then had become most adventurous, and I were about to start on July first, and were making things ready, when two of my deserters returned and begged me to take them along again. They had found living at their own cost rather expensive, and had realized that it would have been an impossibility for them to get out of that place again with the funds at their disposal. Each meal had cost them a small fortune. Animals were extremely expensive, and it was then the wrong season for launches to come up the river as far as Rosario, the nearest port to the south.

"We will come with you," said they, in a sudden outburst of devotion. "We will come. We are brave men. You have always been good and generous to us. We are sorry for what we have done. Order us and we will kill anybody you like for you!"

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Brazilians of that class have only one idea in their heads — killing, killing, killing!

That was more devotion than I demanded. In order to spare Alcides and Filippe and myself, as the work thrown upon us would have indeed been beyond our possible strength, I re-employed the two men on the express condition that they should murder no one while they were with me.

At noon of July first, accompanied by a mounted escort of honour of the leading citizens with the Mayor at their head, I left Diamantino (elevation 1,030 feet), travelling northeast. We ascended to the summit of a tableland, the first terrace of which was at an elevation of 1,250 feet, the higher at 1,600 feet. The last words I had heard from a venerable old man as I rode out of Diamantino still rang in my ears.

“ You are going to sure death — good-bye! . . . ” On reaching the top of the plateau the courteous friends who had accompanied me also bade me an affectionate farewell. I could see by their faces and their manner that they were saying good-bye to one they believed a doomed man.

“ If by chance you come out alive,” said the Mayor, in a tentative way, “ we should like to have news of you.”

On dismal occasions of that kind the sky is always gloomy and black, and there is always drizzling rain. So that day, too, the weather did not fail to add to our depressed spirits.

On leaving our friends we started to plunge once more into the unknown. On reaching the top edge of the plateau we witnessed a wonderful sight, rendered more poetic by the slight vagueness of a veil of mist. To the south of Diamantino was the Serra Tombador, extending as far as S. Luiz de Caceres, about 250 kilometres, as the crow flies, to the southwest. Then below us was the Lagõa dos Veados with no outlet, and close by the head-waters

THE SYPHONIA ELASTICA

of the Rio Preto (a tributary of the Arinos). The Serra do Tombador was parallel nearly all along with the river Paraguay.

Because of departing so late in the day from Diamantino, and the time we had wasted on the way with social compliments, we were able to go only twelve kilometres that afternoon. We halted near the shed of a *seringueiro* (rubber collector), at an elevation of 1,530 feet, close to the Chapesà, a streamlet flowing into the Agua Fria (cold water), which in its turn threw itself into the Rio Preto.

It was muggy and warm during the night — minimum 65° Fahrenheit — with swarms of mosquitoes. We were glad to leave the next morning, following a northwesterly course across a wonderfully beautiful meadow, with circular groups of trees and a long belt of vegetation along the stream. It was then that I made my first acquaintance in Brazil with the *seringueira* (*Syphonia elastica* or *Hevea brasiliensis*), which was fairly plentiful in that region. As we shall see, that rubber tree, producing the best rubber known, became more and more common as we proceeded north.

In the cuts of rivers, soft, red, volcanic rock was exposed, with a surface layer of white sand and grey ashes in the flat meadow. The padding of earth was thin. Except close to rivers and in extinct craters where the accumulations of earth and cinders were often deeper with a good supply of moisture from underneath, the trees were feeble and anæmic. There again I was amazed to find how unstable and weak most trees were. One could knock them down with a mere hard push — as the roots had no hold in the ground, where they spread horizontally almost on the surface, owing to the rock underneath which prevented their penetrating farther than the thin upper layer of earth, sand, and ashes. If you happened to lean against a tree four or five inches in diameter, it was not uncommon to have the tree tumble down and you, too. The wood also

ACROSS UNKNOWN SOUTH AMERICA

of those trees was very brittle and watery, with no power of resistance worth mentioning.

Many were the streamlets which flowed into the Rio Preto at elevations from 1,450 to 1,500 feet, viz. the Burity Comprido, the Bujui, the Grinko, the Pomba, the Corgo do Campo, the Ribeirão Grande, and the Stiva. Many of those streamlets had beautiful beds of white marble pebbles, which made their cool and clear water look and taste perfectly delicious. Others, with soft, black mud bottoms, especially in *cuvettes*, were extremely troublesome to cross.

On the banks of those streams were marvellous *pacobeira* palms — a kind of giant banana palm, attaining a height of thirty to forty feet, with a stem, ovoid in section, of great length, and from which shot out paddle-like leaves of immense size and of a gorgeous green, six to seven feet long and three feet wide.

On July third we went through thick, dirty, low scrub and forest, except along streams, the banks of which were lined with tall, anæmic trees an inch in diameter with a mere bunch of leaves from branches at the summit. We again met with several *cuvettes*, very grassy, with the usual florid growth of trees in the centre. Those depressions were 1,400 feet above the sea level. From many of the trees hung huge globes, like tumours. They were nests of *cupim*, the destructive white ants (*termes album*), of which there were swarms everywhere in that region. In one night they ate up the bottoms of most of my wooden boxes and rendered many of our possessions useless. They ate up our clothes, injured our saddles by eating the stitching; anything that was not of metal, glass, or polished leather was destroyed by those little devils.

We were beginning to descend gradually on the northern side of the tableland. After crossing a pass 1,350 feet above the sea level we arrived on a lagoon to our left. Shortly after we reached the left bank of the Arinos

THE RIVER ARINOS

River, separated there from the lagoon by a narrow tongue of high land, some thirty feet high, between the two waters.

It was thus that on July fourth we encamped on that great tributary of the Amazon. We were still thousands of kilometres away from its mouth. My animals were quite exhausted and were unable to continue. Moreover, the forest near this great river, already, so near its birth-place, over 100 metres wide, would have made their coming along quite impossible, as the grazing was getting scarce, and would be scarcer still as we went on north. Then, as the river Arinos took me in the direction in which I intended to travel, I had made up my mind to abandon the animals at that spot and attempt to navigate the river, diabolical as its reputation was.

We had now travelled on horseback some 2,000 kilometres from the last railway station, of which about 600 kilometres were over absolutely unknown country. Rough as the travelling had been, it was mere child's play compared with the experiences we had to endure from that day on.

END OF VOL. I





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